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OVARIAN PHYSIOLOGY AND PATHOLOGY.

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CONTRIBUTIONS

TO ASSIST THE STUDY OF

OVARIAN PHYSIOLOGY AND PATHOLOGY.

BY

CHARLES G. RITCHIE, M.D.

FELLOW OF THE ROYAL MEDICO-CHIRURGICAL SOCIETY, MEMBER OF THE LONDON OBSTETRICAL
SOCIETY, CORRESPONDING FELLOW OF THE EDINBURGH OBSTETRICAL SOCIETY,
ETC. ETC.

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BIBLIOTHECA · BODLEIANA ·
DOMINUS ILLUMINATIO MEA

TO

THOMAS SPENCER WELLS,

SURGEON TO HER MAJESTY'S HOUSEHOLD
AND
THE SAMARITAN HOSPITAL,

These Pages are Inscribed,

AS A SLIGHT TOKEN OF ADMIRATION OF
THE UNTIRING ZEAL WITH WHICH HE HAS LABOURED TO PERFECT
THE ONLY EFFECTUAL METHOD OF TREATING
THE GRAVER FORMS OF
OVARIAN DISEASE.

PREFACE.

THERE is probably no department in physiology so generally attractive as Embryology. The student is drawn almost irresistibly to peer as deeply as he may into that mystery of mysteries by which a simple cell becomes converted into a thinking human being.

The study, then, of the gland in which the ovum is produced, the attempt to trace the ovum backwards to its earliest traces, and haply to discover some general law which might give the key to part of the mystery, is a study which is only too seducing, and may even lead to loss of time as great and apparently as useless as the studies of those who searched for the Philosopher's Stone and for the Elixir of Life.

Some time ago my attention was directed in a special manner to the pathology of the ovary, and Mr. Spencer Wells was kind enough to allow me to examine a large number of the ovarian tumors which he removed by ovariotomy. A very little observation was sufficient to show that the so-called 'ovarian cyst' may be produced in many different ways, each morbid process being a modification, generally a very slight modification, of some process which physiologically takes place in the ovary.

The study of these processes, whether physiological or pathological, is beset with many difficulties, and it is therefore not surprising that authors differ much with regard to them; and have expressed opinions which are sometimes really, sometimes apparently, inconsistent with each other. These different opinions are widely scattered; some are buried in forgotten journals, many are written in foreign languages; but as little progress can be made unless the student be acquainted with the labours of his predecessors, I have attempted here to give a brief summary of the results of those labours. Among other papers, I naturally paid much attention to a series of observations on the ovary which my father published more than twenty years ago in the 'London Medical Gazette.' In these observations my father distinctly enunciates and proves a doctrine which has very recently been revived by German physiologists, and which I conceive to be in a great measure the key to the right understanding of most of the forms of morbid ovarian change. My father distinctly shews that active changes are constantly going on in the ovary from the very earliest to the very latest period of life; that before puberty as after it—during pregnancy, during lactation, during amenorrhœa, and even after the final cessation of the menses—vesicles are constantly being formed in the ovary, and constantly perishing.

My father's papers appear to me to be so valuable that, with his permission, I now reproduce them *in extenso.*

They are reprinted textually from the pages of the 'London Medical Gazette:' no alteration whatever has been made in them, and in reading them one cannot fail to be struck with the slightness of the change which the last twenty-two years have made in our ideas of ovarian physiology.

After examining a number of ovarian tumors I became strongly impressed with the idea that ovarian cysts are occasionally 'moles,' or ova which have undergone a certain amount of development.

This led me to examine with great care a dermoid cyst which Mr. Wells removed from a young virgin, and I hope that I have succeeded in proving that such a cyst is certainly derived from an ovum, and has little in common with that form of subcutaneous dermoid cyst which is not unfrequently met with in the region of the eyelids. Of course, if it be once proved that unimpregnated ova may go on to the formation of such highly organised structures as bone and cartilage, it is easy to believe that they may stop short at some previous stage and form cysts.

I publish my present 'Contributions,' with a sincere hope that they may be of use to those who are working in the same field as myself. To the general inquirer they will give a fair synopsis of what is at present known on most of the points of interest in ovarian physiology and pathology.

Mount Street, Grosvenor Square:
June 1865.

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CONTRIBUTIONS

TO ASSIST

THE STUDY OF OVARIAN PHYSIOLOGY AND PATHOLOGY.

CHAPTER I.

HISTORICAL SKETCH: FROM REMOTE TIMES DOWN TO 1844.

Hippocrates—Vesalius—Harvey—Malpighi—De Graaf—Swammerdam—Jerome Barbatus—Bartholin—Leeuwenhaech—Hartsœher—Bohn—Andry—Naboth—Nigrioli—Morgagni—Samson—Hans Sloane—Duvernay—Astruc—Manning—Baron—Hodgkin—Seymour—Cruveilhier—Bright—Virchow—Negrier—Lee—Raciborski—Paterson—Montgomery.

THE ancient writers, from Hippocrates down to Vesalius, believed that the ovary was identical in structure with the male testicle, and only different from it in being within the abdomen instead of being external to it. Vesalius, indeed, and his followers described the ovary as being made up of a series of vesicles; but they imagined these vesicles to be formed by convolutions of seminal vessels which terminated, as in the male, in a vas deferens. The function of these seminal vessels was to produce semen, and, therefore, we hear of the *semen fœmininum* in contradistinction to semen masculinum. There was much dispute as to the part played by the semen fœmininum in conception. Some thought it most essential, while others considered it to be simply a fertilising fluid with which the uterus, like a garden, required to be irrigated, in order to make it fertile soil in which the semen masculinum might take root.

Towards the middle of the seventeenth century, when Harvey published his book '*De Generatione Exercitationes*,' he unseated all preconceived ideas of the ovary, and led to the famous discussion between Kerckring, De Graaf, and others. Hippocrates knew quite well that in the human species as well as in mammalia, the young animal springs from an egg; but he and his followers believed that this egg was formed in the uterus either by the semen masculinum alone, or from the mixture of the semen derived from the two sexes. De Graaf and Steno asserted that the ovarian vesicles were in reality the eggs, that they were precisely analogous to the eggs of birds, and that the sole use of the ovary was to produce these eggs, not to secrete a supposititious fluid.

There was one flaw in De Graaf's theory, and he well knew it. He and his contemporary, Malpighi ('*Epist. ad Oldenberg.*' No. 5) had seen the egg in the Fallopian tube, but he thought it strange that it was then only a tenth of the size to which it had reached while still in the ovary; Malpighi attempted to explain away this. He described the corpora lutea as glands, for the purpose of secreting ova; and as formed by the conglomeration of several ovarian vesicles. Malpighi's idea was both ingenious and plausible. He considered the projections of the inner yellow lining of the corpora lutea as glandular lobules, and the clot in the centre as 'an ash-coloured body, very probably vascular, which is divided into branches in a vascular manner.' Within this ash-coloured body or attached to it in some way was the ovum. ('Transact. Royal Society,' 168, No. 161, p. 630.) In speaking of the vesicles of the ovary, Malpighi says that he has seen them larger than a hen's egg, and full of albumen,—evidently an early stage of ovarian dropsy.

Harvey's 'Essay on Generation' was not such a masterpiece as might have been expected from the great discoverer of the circulation of the blood. In the book there are traces of the gradual alteration of opinion which is the lot of every explorer into the unknown. In justice to Harvey, it must be remembered that he had not an opportunity of revising his work. Wearied by the discussions which had been raised in his former publications, and distressed beyond measure at the loss of his papers during his flight with the king, the great philosopher, now an old man, shrank from being obliged to defend himself from a new storm of abuse. To his friend Ent, indeed, we are obliged for having saved the essay by the use of artifice. (Harvey, '*De Generat. Animal.*' Ludg. Bat. 1737, Preface by Ent.) Harvey vigorously attacked the theory of spontaneous generation, and upheld the doctrine that every living thing springs originally from an ovum. His idea of the action of the semen may be gathered from the following sentence extracted from a paper by an unknown author, delivered at the Royal Society in the year 1692. The author had just been describing a case in which a woman had been impregnated in spite of the vagina being absolutely closed by inflammatory adhesion of its walls. He says, 'Upon revolving this case frequently in my mind, how it could happen that this woman could conceive, when neither the member nor seed of the male could approach near the womb, I recollected the opinion of the learned Dr. Harvey, in his book upon 'Generation' (which from this demonstration I am obliged to assent to), viz., that the fœtus is not formed from the male seed conveyed into the uterus, but that the whole mass of blood (as if by a kind of injection) receiving a plastic force from the semen, communicates it to the eggs fallen down in the uterus, whereby they are rendered fruitful. And I am the more of this opinion because I know that the woman was extremely anxious to have a child, which doubtless increased the vigour of her embraces with her husband; and it seems very probable that in the time of coition, when she was strongly stimulated, the animal spirits at that time flowing in great abundance, attracted some effluvia from the seed of the male, and communicated a fecundity to the mass of blood, and so to the eggs contained in the uterus.' ('Transact. Royal Society,' No. 237, p. 56.)

De Graaf's great book appeared in 1671. In it he first substituted the word *ovaries* for *testicles*, the term previously applied to the female germ glands. He not only described as ova the vesicles which have immortalised his name, but he also gave a description of peculiar corpuscles of a yellowish tint which were formed in the ovaries after coitus, and which he asserted he had also found in the Fallopian tubes. Swammerdam ('*De Uteri Muliebr. Fabrica,*' in Manget, '*Bibl. Anat.*' p. 497), Malpighi, Redi, the physician of the Grand Duke of Tuscany, and others, confirmed De Graaf's observations, and the theory of 'Evolution' appeared to be established. In 1676, Jerome Barbatus published a work (‘*De Formatione et Nutritione Fœtus*’) in which he asserted that this new doctrine of evolution was entirely false, and that the Graafian vesicles were nothing but hydatids. The younger Caspar Bartholin immediately launched his book on the ovaries, in which he attempted to distinguish between the Graafian vesicles and those so-called hydatids. During the course of the next year, 1677, a young doctor of Dantzic showed to Leeuwenhoeck, a professor at Delft, the spermatic animalcules. Here was ample ground for new theory. The idea of the embryo being formed in the ovary was at once set aside. Here we had actually under our eyes little living animals with a large head and a long tail; it was evident that they only required to be nourished in the fertile soil of the uterus in order to be developed into perfect human beings. Leeuwenhoech made a brilliant series of discoveries. By careful examination and long-continued study, he was at length able to distinguish between male and female spermatic animalcules; he saw them in the act of copulation, and had no doubt that they propagated their species, although, when pressed by Boerhaave, he admitted that he never had seen any small ones. Hartsœher (‘*Essai de Dioptrique*,’ Paris, 1694) was shocked at the idea of the ovum being perfectly useless, and consequently discovered that the spermatic animalcules inserted their tails into the eggs, and thus drew their nourishment. He distinctly saw a resemblance between the form of an animalcule and that of a man.

After a time, people became tired of their hobby and went back to the old ideas. Jean Bohn (‘Circular,’ p. 14) published a work on physiology in which he defended De Graaf. He was decidedly of opinion that the aura seminalis transmitted through the porous structure of the uterus reached the ovary and fertilised the ovum, which then descended through the Fallopian tube. Sometimes, however, the ovum might become detached without sexual intercourse; and in either case a yellow body was left behind in the ovary to mark the place where the ovum had been. In 1700, Andry's book upon worms appeared: ‘*De la Génération des Vers dans le Corps de l'Homme*.’ He asserted that he had seen the spermatic animalcules in the Fallopian tube, and that there was no doubt whatever that they penetrated into the ovum through a valvular opening, and there became developed into perfect animals. In 1701, there was a grand discussion at the Académie des Sciences, at Paris, on the subject of generation. Méry, Duvernay, and others, took part in it, but little or nothing resulted, certainly no great advance was made. A few years later, however, Naboth, a professor at Leipsic, discovered a new ovary. He was struck with the fact that he had often found the ovaries diseased, although the woman had not been sterile; and as he had seen a number of vesicles in the cervix uteri similar apparently to those described by De Graaf, he concluded that they too were ova. Naboth not only succeeded in bringing himself to believe in his new ovary, but he actually persuaded the celebrated Hoffman that he was correct. And even now we have no better-known name than the ovules of Naboth for those sacculated dilatations of the mucous follicles which are occasionally met with in the cervix uteri. About the same time, Nigrioli, a professor at Ferrara, advanced a step by finding Graafian follicles in girls not yet nubile. This same Nigrioli attempted, like many of his contemporaries, to distinguish between hydatids of the ovary and the vesicles of De Graaf. He tells us that the latter may be distinguished, as they are only observed on the circumference of the ovary, while the eggs of De Graaf are in many animals attached to a stalk. In 1741, John Baptist Morgagni, in his '*Adversaria Anatomica Omnia*,' threw the light of his genius over the anatomy of the ovaries. He could not forget what appeared to have been overlooked by many, that the great objection to the evolution theory of De Graaf was the large size of the ovarian vesicles, compared with that of the vesicles which had been seen in the Fallopian tube. He made no assertion, but he guessed the truth. 'How much more likely is the conjecture that they are glands secreting fluid for the purpose of keeping the ovum safe, and helping it to escape when the proper time arrives!

We have been obliged to trace the history of the progress made in the knowledge of the normal anatomy of the ovaries, rather than that of the morbid anatomy, because the two conditions were confused in the minds of the older writers. Thus we have Malpighi describing an ovarian vesicle of the size of a hen's egg, or larger, as a normal structure; while Morgagni, on the other hand, describes corpora lutea as if they were morbid growths.

It must not, however, be imagined that the writers of the seventeenth and first half of the eighteenth centuries were ignorant of the occurrence of large multilocular ovarian tumours.* On the contrary, we find those structures most graphically described on more than one occasion. During the last decade of the seventeenth century, several papers on the subject were read before our own Royal Society. Thus Dr. Henry Sampson treated what he supposed to be a case of ascites; the woman died, and the body was opened. 'Having separated the muscles of the abdomen,' says Dr. Sampson, 'I found no serum or hydropick water therein, but a heap of bladders of several sizes presented themselves. From the greatest whereof, being pierced, there issued twenty pounds more' (she had formerly been tapped) 'of a brown and thickish serum, tinctured with a sediment of the colour of amber. Some of the lesser were about the bigness of a child's head, which yielded a slimy serum in consistence and colour like the mucilage of quince-seeds. Others were much less; some as big as a man's fist, some as an ordinary apple, and some as a walnut; in most of which was contained a serum like the white of an egg; in some of them much less viscous and somewhat white, like starch newly boiled.' . . . We are then told how all these bladders were found to belong to the left testicle, or ovary;—'*the aforesaid bladders being nothing else originally but the eggs belonging to this left ovary.*' 'Imagine you saw forty bladders, some of a little pig, others of a hog or a calf, and some of an ox, all distended with liquor, and tied like a reeve of onions all together, and you have also seen this ovary.' ('Trans. Royal Society,' No. 140, p. 1000; Lowthorp, iii. 211.)

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* Among the ancient writers only the very vaguest description of symptoms and appearances which may possibly have been the signs of ovarian disease are to be found. Hippocrates, Celsus, and all his followers, were well acquainted with ascites and also with hydrocele in the male. Hippocrates refers most dropsies to disease of the liver or spleen; but he alludes to one species of dropsy as disease of the parts situated in the loins. Galen and Stephanus agree that he meant the jejunum, meseraic veins, and kidneys (Edit. Dietz, p. 189). These writers all approve of paracentesis. Paulus Ægineta gives a formula for a medicated pessary to be worn by dropsical women; Hippocrates described hydrometra; hydatids are spoken of by Aretæus, Galen, and Rhazes.

A still more interesting paper is one by Dr. Hans Sloane, where there is a description of dropsy of one of the ovaries. 'What was very strange, was that several bags of the larger size in this ovary contained others smaller within them; and those which were larger were filled with a mellaginous liquor, those smaller with one like whites of eggs. Here and there between were apostemes, which were but small, and filled with yellow matter.'

Such was the state of science with reference to the ovaries at the end of the seventeenth century.

Fifty years later, Morgagni speaks of an osseous ovarian cyst. He mentions it in his first '*Disputatio*,' p. 41. He is telling his opponent that he has a difficulty in describing normal ovarian structure, because he cannot distinctly differentiate between normal and morbid growths. 'For,' says he, 'not to speak of vesicles filled with pus and grumous matter, which I met with lately in many cysts belonging to an ovarian tumour as large as the fist, or others, of which one was evidently bony, while the other had plainly discharged bones, and others of this kind, which, indeed, are not extraordinarily abundant, I certainly often find within the ovaries a number of cellules whose tunics are sometimes green or yellow, but more commonly iron-colour and black, and which contained a small black soft body, which, unless it was a clot of blood, resembled it very closely.'

By the 'cellules, whose tunics are sometimes green,' &c., Morgagni evidently means corpora lutea.

We pass over twenty years. In the year 1761, Duvernay, in the second volume of his '*Œuvres*,' entered fully into the physiology of generation. For the most part he followed Harvey. He believed that the semen fermented the whole blood of the woman after copulation, and that the ova were impregnated by the blood thus fermented. He perpetuated, too, the error that the corpora lutea were glands secreting ova, and described the decolorised clot so frequently seen in the centre of a corpus luteum as the ovum attached to an umbilical cord. In the year 1762, almost simultaneously with its publication in the French language, appeared, in English, 'A Treatise on the Diseases of Women, by Dr. J. Astruc, Royal Professor of Physic at Paris, and Consulting Physician to the King of France.' In this book there is a chapter devoted to the diseases of the ovaries. The author classifies them under six heads—

(*a*) Inflammation; (*b*) Scirrhus; (*c*) Hydatids; (*d*) Encysted Dropsy; (*e*) Ovarian Pregnancy; (*f*) Encysted Tumours.

The inflammation of the ovary might go on to gangrene. The scirrhus, hydatids, and encysted dropsy were the result of stagnation in the lymphatics. If the stagnation were general, scirrhus (sarcoma) was produced, and this scirrhus might degenerate into true cancer. If the lymph stagnated only in the superficial lymphatics, it dilated the segments between the valves and formed hydatids. If these hydatids grew considerably, they produced encysted dropsy. Ovarian pregnancy was most common in unmarried girls, and was the result of shame. As to the sixth variety, Astruc seems to be in doubt; so he falls back on the old story, and says those too are formed by dilatation of the lymphatics; but he qualifies the statement by admitting that in some cases they are evidently the result of ovarian pregnancy. All ovarian cysts whose contents were not purely serous or purulent seem to have fallen under the last head. In speaking of hydatids of the ovary, Astruc says, 'There are some authors who are of opinion that hydatids are formed by the tumefication of the ova, or vesiculæ, contained in these cellulæ; but that appears to be impossible, as these vesiculæ are under the coat of the ovary.' The observation appears rather singular. Astruc must have been conversant with the thin walls of the Graafian follicles when near maturity; and they certainly have less the appearance of being contained within the coat of the ovary than larger cysts. Astruc appears to imply, also, that the ovary was provided with lymphatics external to the tunica albuginea.

Such as it was, Astruc's treatise seems to have been for some time the best guide to ovarian pathology in the English language. The great accoucheurs who were Astruc's contemporaries passed over the subject in silence.

In 1771, Manning published a book on diseases of women, and dismissed the diseases of the ovaries and Fallopian tubes in two or three pages of large type. He threw no new light on the subject.

In the beginning of the nineteenth century, the word 'acephalocyst' began to be used. The idea of cystic degeneration being dilatation of lymphatic vessels was abandoned, and people rushed into the opposite extreme. Everything was an hydatid, an acephalocyst; and yet no definite meaning was attached to the term. Lecat thought that the eye was a perfect hydatid; an hyatid, an imperfect eye. There were not wanting, however, original observers in this country who clung to the old lymphatic theory. Of those Baron was the most notable. He held that all cysts were originally produced by moniliform contraction of the lymphatics; and that, subsequently, their walls increased in density, the increase varying from simple thickening to cartilaginous degeneration; while the contents also varied by the rupture of vessels, &c. Dr. Baron carried out his theory to its true logical conclusion, viz., that what we call malignant disease may be produced in any animal by bad air and bad nutrition. Closely allied to this lymphatic theory is another which was afterwards advanced by Cruveilhier, viz., that ovarian cysts were sometimes mere dilatations of ovarian veins. The distinguished French pathologist informs us that he was led to this conclusion by comparing ovarian cysts to hydatids of the placenta.

In 1829, Dr. Hodgkin read a paper before the Medico-Chirurgical Society 'Upon some Adventitious Structures.' In this able paper the author asserts his belief in the parasitical nature of hydatids, and adverts to the formation of cysts by the obstruction of excretory ducts and by the dilatation of cells normally existing. Under this last head he says, 'Of this description are the enlarged vesicles of De Graaf, which, though probably never so much enlarged as to constitute ovarian dropsy, as some have supposed, are nevertheless frequently met with many times larger than their natural size.' Dr. Hodgkin having thus cleared his way, goes on to the consideration of the adventitious serous membranes, which he considers to be, 'with very few exceptions, the result of an entirely new formation, dependent on some anomaly in the function of nutrition, but concerning the precise nature of which we are completely in the dark.' Dr. Hodgkin divides the serous cysts (adventitious serous membranes) into two classes, the first of which comprises those which are simple and generally solitary, while the second have the remarkable property of being able to reproduce themselves *ad infinitum.* A simple cyst, he argues, may be multiple and occur in the ovary, i.e., a number of simple cysts may be in accidental collocation. Cysts of the second class (proliferous) are found in great abundance in the ovary. Often before the termination of the case the contents of such cysts have become purulent. Dr. Hodgkin then describes the various kinds of proliferous cysts, and says that it is evident that the secondary cysts are not hydatids—'First, because the bunches or clusters of secondary cysts are invariably and permanently attached to and continuous with the internal surface of the superior cysts in which they are contained; and, second, because delicate vessels are seen ramifying from the one upon the other.' According to Dr. Hodgkin, dendritic formations are clusters of cysts prevented from expanding by being too closely planted together. Permanent adhesion sometimes takes place, at other times cysts dilate as soon as they overtop their fellows. Bunches of cysts, which have lost their vitality by this process of strangulation, act as foreign bodies, and produce inflammation of the cysts which contain them.

In the year 1830, Dr. Seymour, of St. George's Hospital, published his 'Illustrations of some of the principal Diseases of the Ovaria.' In this work he describes proliferous cysts as being undoubtedly cancerous. He thinks, however, that simple cystic disease of the ovaries (dilatation of a Graafian vesicle) is not uncommon. He writes—'The malignant form of the diseases may be recognised during life by the want of nutrition and broken health of the patient, the unevenness and rapid growth of the tumour, the simultaneous enlargement of glands in other parts of the body, and the occasional occurrence of lancinating pains in the part.'

The opinion brought forward by Cruveilhier (1836), in his 'Morbid Anatomy,' is almost identical with that of Seymour. He admits that a single Graafian follicle may become enormously distended, and he protests against the use of the word '*colloid*,' which was beginning to come into fashion. He says—'It is really under the category of areolar and gelatiniform cancers that ovarian cysts ought to be placed—cancers which have been designated by the improper name of "colloid," and which differ from areolar and gelatiniform cancer of the stomach only in the capacity of their meshes.'

In 1838, Dr. Bright wrote his celebrated monograph on ovarian tumours. He says—'There are perhaps four distinct diseases which form pelvic tumours, andwhich are therefore spoken of as ovarian dropsies.' The first is dropsy of the Woolfian body, the second dilatation of the Fallopian tube, the third dilatation of a Graafian follicle, and 'the fourth, by far the most frequent form of ovarian tumour, is essentially a specific disease assuming all the varieties of structure which result from the numerous modifications of that morbid action called malignant.' With the true greatness of a powerful intellect, Dr. Bright confesses that in many cases it is impossible to determine whether the Graafian follicles or the stroma may be the seat of the disease; and if the latter, whether the cysts are entirely new formation, as Hodgkin supposed, or whether they are not merely infiltrated interspaces, or meshes of cellular tissue. Dr. Bright was entirely practical. He described everything he saw; he procured from Dr. Owen Rees exact analyses of the cystic contents, but he indulged in no speculations. He accepted the *malignancy* of the disease, and with this word explained all. In one case (No. 19) the cyst had ruptured into the peritoneum, and malignant nodules were found in the liver and other organs. This proved that the rupture, by diffusing the malignant matter in the peritoneal cavity, facilitated greatly its absorption into the system. No doubt this individual case must have been cancerous, but Dr. Bright seems to have generalised rather too much upon it and analogous cases. Dr. Bright was an observer at the bedside perhaps more than a morbid anatomist, and finding that he could not cure ovarian disease, observing the cachectic look and surely-fading strength of his patients—seeing, too, that malignant disease of other organs was occasionally combined with disease of the ovaries—he concluded that in the immense majority of cases ovarian disease was itself essentially malignant.

About the same time (1838), the colloid theory, which we have seen broached in England and France, received in Germany its full expansion, for Virchow wrote a paper with the object of showing that *all* ovarian cysts are of a colloid nature. The idea was seducing, and, handled by Virchow, was extremely plausible. Spaces form in the substance of the ovary, they are provided with a thick layer of epithelium and are full of a jelly-like substance. In consequence of the gradual increase in quantity of the jelly-like contents, and of new spaces being continually formed, the alveoli develope themselves towards the periphery, and thus become wedge-shaped, the base of the wedge looking towards the periphery, its point to the centre of the ovary. The partitions between the alveoli atrophy and disappear, the jelly becomes more fluid and is variously altered, and thus are formed the different varieties of cysts.

In 1840, Negrier published his '*Recherches Anatomiques et Physiologiques sur les Ovaires*,' a work which must be regarded as a great step in advance, for its avowed object is to show that the pathological are only modifications of the physiological changes in the ovary. To understand M. Negrier, we must premise what he says with reference to the normal anatomy of this ovary. He believes that the parenchyma of the ovary of a child newly born is homogeneous. During the first year, little miliary granulations appear, in whose immediate neighbourhood are soon found small vesicles (primary vesicles), whose wall consists of two layers. At about the age of ten years, the vesicles begin to increase in size, and a greyish matter is deposited between the layers, producing the condition known as *bourses grises* (corpora albida of Ritchie). The grey deposit becomes yellow at puberty and thus are produced the vesicula lutea (corpus luteum). Negrier comes to the conclusion that simple cysts of the ovary are due to an alteration in nutrition of the primary vesicle, that fibrous tumors and encephaloid of the ovary are due to an alteration in nutrition of the '*bourses grises*,' and that a similar mal-nutrition of the corpora lutea would produce cysts containing matter of the consistence of lard.

When Negrier published his book, opinions as to the ovaries were in a most unsettled condition. Many years previously, Bäer had discovered the true ovum, and thus set at rest the difficulty which had perplexed De Graaf. Coste and Wharton Jones had described the germinal vesicle ('London and Edinburgh Philosophical Magazine,' Sept. 1835), and even the germinal spot had been discovered. Some staunch conservatives stood out manfully against the innovation. Dr. Lee asserted that it was problematical whether an ovum ever passes along the Fallopian tubes into the uterus, either before or after conception ('Cyclopædia of Practical Medicine,' vol. ii. p. 228). To Dr. Lee, however, we owe much, for he was the first to illustrate by dissection the periodical rupture of the Graafian follicles.

From the year 1840 to 1845, there was much discussion on the subject of the corpora lutea. It was agreed on all hands that yellow bodies did occasionally exist in the ovaries; but there was a great dispute as to their structure, their function, or their import. Dr. Robert Lee held that, when a Graafian vesicle burst, yellow matter was formed external to its coats. Montgomery and Paterson thought that the yellow colour was due to an extravasation of blood or of albuminous fluid between the two coats of the vesicle. Coste and Raciborski insisted that the corpus luteum was formed by a thickening and coloration of the internal coat of the upturned vesicle.

It was in the midst of this discussion that my father began to publish his observations. The first paper appeared in 1843; Raciborski's pamphlet, '*De la Ponte périodique chez la Femme et les Mammifères,*' not being published till a year later.

Recent experience seems to point to a more simple explanation of corpora lutea than that which is given by my father; but in his papers will be found the first exposition of the fact that active changes are always going on in the ovary independently of menstruation. My father shows well that corpora lutea are dependent on menstruation, that the mere rupture of a Graafian vesicle is insufficient to produce a corpus luteum, and he clearly traces the influence which is exerted upon a yellow body by pregnancy—a subject of great interest in a medico-legal point of view.

CHAPTER II.

CONTRIBUTIONS TO THE PHYSIOLOGY OF THE HUMAN OVARY, BY DR. RITCHIE, OF GLASGOW.

(REPRINTED FROM THE LONDON MEDICAL GAZETTE OF 1843–45.)

FIRST SERIES: DISSECTIONS.

PART I.—In cases where impregnation had never obtained.—Section 1. Ovaries in subjects who had not menstruated.—2. Menstruation regular.—3. Menstruation commenced, but never regularly established.—4. Menstruation established, but suppressed before death.—5. Menstruation ceased from age.

PART II.—In cases where pregnancy had occurred, the ovaries being examined at different periods of utero-gestation or after delivery.—Summary.

THE following dissections were made by the writer during the last three years and a half, while he occupied the physicianship of the Royal Infirmary, and the notices of them were engrossed in a commonplace-book at the time. In undertaking the investigation, he was influenced only by a desire to avail himself of the advantages of his position in regard to a subject having a physiological, and in its relations to jurisprudence a moral, interest of no ordinary kind. No one can be more sensible than he is, how far, from the pressure of more urgent avocations, and other causes, he has fallen short of his object; and in submitting his researches to the profession, when from circumstances he cannot longer continue them with the same facilities, he is influenced rather by a wish to suggest the subject, under some modifications of form, to others, than by any notion that in his hands the enquiry has been exhausted. The paper has been arranged into a detail of cases, and a summary: the former being subdivided into two parts, and each of these respectively into several sections as follows:—

PART I.—Dissections of the human ovary in cases in which impregnation had never obtained.

II.—Ditto in individuals who had been pregnant, the ovaries being examined at different periods of utero-gestation, or after delivery.

Under Part I. are examined—

SECTION I.—Ovaries in subjects which had not menstruated.

II.—Cases in which menstruation had existed regularly, the parties never having been pregnant.

III.—Cases in which menstruation, although commenced, had never been regularly established, the individuals not having had children.

IV.—Cases in which menstruation had continued regular for a longer or shorter period, but had been suppressed for some time before death, the women never having had children.

V.—Cases in which the subjects had outlived the menstruating period of life without children.

Under Part II. are examined—

1. Ovaries of parties either supposed or really pregnant, examined before the completion of gestation.

2. Ovaries of women who died within one month after delivery at the full period.

3. Ovaries of women who died within, or at, two months after delivery at the natural period.

4. Ovaries of women dying from two to three months after delivery at the natural term.

5. Ovaries in individuals dying four months after natural delivery.

6. Ovaries in women five, six, seven, ten, twelve, and thirty-six months respectively after natural delivery, menstruation not having been re-established.

7. Ovaries in subjects who had had children, but were afterwards menstruating.

8. Ovaries in individuals who had had children, and in whom menstration, re-established, had been arrested by disease.

9. Ovaries in persons who had had children, and who had ceased to menstruate from age.

PART I.

DISSECTIONS OF THE HUMAN OVARY IN CASES IN WHICH IMPREGNATION HAD NEVER OBTAINED.

SECTION I.—*Ovaries in subjects which had not menstruated.*

1. A healthy new-born infant at full time. Fallopian tubes and uterus could not be permeated by air; but on examining the os uteri, it was found occupied by a plug of thick tenacious mucus, of the colour and consistence of glue, which also filled the uterine cavity, dilating the former to a size equalling that of the tip of the little finger, and permitting the arborescent structure of the cervix to become visible. On removing this mucus, which was effected with difficulty, the last portions being tinged with blood, air was made to pass with ease from the pavilion of one of the tubes to the os tincæ. Ovaries scarce an inch in length, or two-eighths broad, of a triangular shape, the apex being represented by the free mesial line of the gland, and the base by its sessile portion expanded on each side into a loose margin, which was denticulated by several notches. Outer surface of ovaries smooth, and of a uniform fawn-colour: in interior of one of them two vesicles were distinguished.

2. An infant sixteen weeks old. Fallopian tubes transmitted air with great facility. Right ovary one inch in length, and two-eighths of an inch in breadth at centre. Left ovary seven-eighths long, by two and a half broad. No foramen or cicatrix could be detected on their external surface, which was observed by means of a simple magnifier, however, to be occupied everywhere with the appearance of minute pores, aggregated at some parts into indentations, visible to the naked eye. On boiling, and then cutting the glands vertically, their interior, especially that of one, was found thickly studded with extremly delicate vesicles, filled with a milky fluid, varying in size from that of a pin's head to a mere point, and which became speedily flaccid, and finally disappeared on exposure to the atmosphere, apparently from absorption of their contents.

3. —— Goulden, aged 5½ years. Fallopian tubes pervious to

air and quicksilver. One ovary one inch and a quarter long, and two and a half eighths of an inch broad, and the other thirteen lines in length, and two and a half eighths in breadth. On one of these a transparent spot was observable, which, when viewed by a common two-inch glass, was found to be a very delicate diaphanous vesicle, of the size, when thus magnified, of a mustard-seed, and surrounded at its base with an opaque or white ring. Immediately adjacent to this was a dark spot of the supposed diameter of less than a line, which, examined by the magnifier, seemed to consist of a central puncture surrounded by ecchymosis. Several other copper-coloured spots, in one no less than six, were observed in both ovaries, but without the central opening. These appeared to be occasioned by Graafian vesicles, with their coats in a high state of vascularity shining through the peritoneal covering of the glands. In other respects surface of ovaries smooth. On boiling one of the ovaries, and dividing it vertically at its centre, seven or eight vesicles came into view in different parts of the gland. The best developed were situated almost immediately under the peritoneal coat. One of the largest was of the size of a mustard-seed, had an opaque capsule, and contained an angular-shaped, reddish-coloured coagulum. The capsule of another was of a brick-red colour, and contained a coagulum which was of a lighter shade in its central part, but surrounded by a delicate disc of what appeared to be dark-coloured blood.

4. ——— ———, æt. 13 years. Ovaries one and a half inch long. Surface free from any solution of continuity, but studded with numerous vascular spots of size of coriander seeds, which were produced by Graafian follicles situated at varying depths from surface; some adherent to inner aspect of peritoneal covering, and others projecting this membrane before them into a small elevation, over which the peritoneum was thinned and vascular. One of these vesicles insulated and examined by a powerful microscope, exhibited a number of such vessels ramifying on its surface, and in its interior, the ovulum adherent to the proligerous disc, and containing at the point at which it was thus in contact, the vesicle of Purkinje. The granular nature of the fluid of the Graafian vesicle was also observed. The uterus,

of the size which it is in the infant, contained a starchy-looking fluid.

5. —— ——, æt. 14. Surfaces of ovaries presented numerous livid points produced by Graafian vesicles shining through the peritoneal coat, and some capillary openings were observed at different parts. These latter did not permit of the transmission of a bristle by them into the gland, or lead into any cavity, but were mere points limited to the external aspect of peritoneal covering, and no cicatrices such as are found in the adult were observable anywhere. Interior of ovaries filled with ovisacs of a very minute size, the largest not greater than a pin-head. Some of these were very near the surface, covered with an indusium of the ovary, and under their outer proper coat beautifully injected with red vessels. The fluid contained in them was of a rich amber colour. The fallopian tubes were filled with white mucus.

6. —— ——, æt. 14. Ovaries of medium adult size and plumpness, but without a wrinkle, cicatrix, fissure, or anything remarkable on their surface, except three minute spots, two on one of the glands, and one on the other, which appeared to be Graafian vesicles situated behind or in the texture of the peritoneal coat, and one of them, which to the naked eye was not larger than one third of the size of a pin-head, was apparently a projection through the peritoneum of a segment of the vesicle, its base being surrounded, as seen by a common magnifier, with an opaque ring. Interior of ovaries surcharged with vesicles, one of them as large as a small raisin, the others varying from the size of a hemp-seed to that of those on the surface. These latter were full of fluid, but their coats seemed less vascular and more attenuated than those of the others. No vestige of any vesicle having ever been ruptured was perceptible.

7. —— ——, æt. 15 years. Ovaries of adult size; one of them in particular had its surface stained with numerous whitish points of size of millet-seeds, which were found to proceed from Graafian vesicles shining through peritoneal covering. This latter was completely destitute of cicatrices, except in one of the ovaries, on which was observed one point, best seen with a magnifier, which appeared to consist of a minute foramen, having its edges of a slightly red colour. Inner surface of both ovaries

occupied by the usual membranous pulp of considerable thickness, and giving the idea of a series of horizontal layers of fine tissue, each thickly interspersed with vesicles of different sizes and grades of development, imbedded or suspended in its structure. Some of these had advanced, seemingly by a gradual progression from the central parts of the gland, about half way through the peritoneal coat, and one of them opened by a rather blunt lancet, with no more pressure applied to the surface of the ovary than was necessary for its retention between the fingers, squirted its contents a distance of about twelve inches.

8. ——— ———, 16 years of age, and never menstruated, although her general and uterine systems well developed. Ovaries large, and studded with blue spots about the size of corns of barley, which corresponded with Graafian vesicles, with which both glands were filled. No cicatrices or wrinkles of any kind on surface.

This girl appeared to have been a prostitute. The genitals were ulcerated, and a vesicle filled with lymph, of about the size of a Spanish nut, hung from the pavilion of left fallopian tube.

9. ——— ———, æt. 17½ years. Had not menstruated or had a child. Health delicate, and labia of uterus granulated. Both ovaries plump, of good size, perfectly smooth, and exhibiting a few minute mahogany-coloured spots on exterior. Internally they were filled with vesicles, many of them as large as small dried peas; some of which were vascular, although the greatest number were pale and somewhat flaccid. No traces of a rupture in either.

Case in which it could not be ascertained positively that menstruation had not taken place, but inferentially only, from the circumstance of not being noted in the usual way in the register.

10. ——— Martin, æt. 19. A prostitute. Had not had a child, as judged of by register, by absence of lineæ albicantes on mammæ, thighs, or abdomen; by fact of os uteri retaining its normal form as seen previous to parturition. Some adhesions around ovaries; the outer aspect of both of which latter was smooth and free from cicatrices. Some vesicles of size of a hempseed, with vascular coats, were observed in the central parts of

both ovaries, while more laterally, and immediately under the peritoneal coat, they were smaller, their tissues pale, and over some of them a minute blister was observed in the periphery of the ovary, and in others the appearance of capillary-sized puncta, one of which actually led into an empty Graafian vesicle situated in the peritoneal covering of about the size of a mustard-seed, and was surrounded by some appearance of ecchymosis.

SECTION II.—*Cases in which menstruation had existed regularly, the parties never having been pregnant.*

1. Isabella K——, aged about 17, sober, industrious, and unmarried. Catamenia regularly present for eight periods before death, and the last time ten days before her decease. Cavity of uterus of a sooty colour. Ovaries very large and turgid, each measuring nearly two inches in length, and proportionably thick. No cicatrix was perceptible on their surface, but this was studded in both with small prominent vesicles, of a red colour, like those which we see before puberty, and there were also one or two minute points, in which the peritoneal coat was abraded, and slightly punctulated, as if from the rupture of similar vesicles. Internally both ovaries were filled with vesicles, one of which was very large, and its coats extremely vascular. There were two small and faintly coloured melanotic spots corresponding to vesicles, the coats of which were, however, unaltered in their structure, and unconnected with any external lesion. No trace of a vesicle which had been affected by menstruation was perceptible.

2. Jean S——, aged 18. Menstruating thirteen days before death. Uterus small; the vessels of its entire inner surface greatly congested with black blood. Ovaries of normal length, but not plump, and very pale. No cicatrix on either, but peritoneal covering studded with numerous small bluish spots from adjacency of Graafian vesicles to its inner surface. In the right ovary were numerous vesicles, one as large as a dried garden-pea, and vascular, others of the size of mustard-seed, and some with their coats congested. In the left there were also many vesicles, although smaller and paler than those in the other, and on its superficies there was one minute red puncture, such as is some-

times seen in infancy, or before menstruation or puberty. No fatty tissue, yellow cysts, melanotic spots, or other indication of a Graafian vesicle having been acted upon by menstruation. Character of woman respectable, and os uteri that of virgin.

3. Catherine B———, aged 19. No children. Respectable character. Menses regular, and present nine days before death. Inner surface of uterus red, and fluid in tubes of a reddish colour. Both ovaries large, and mottled by livid maculæ from small vesicles approaching the inner surface of the peritoneal coat. One ovary also exhibited some reddish points, which were small Graafian vesicles already imbedded in its peritoneum and partly projecting from its external surface, and, also, three small cicatrices scarcely perceptible—one corresponding to a cavity of size of a garden-pea, lined with matter having a lively resemblance to convoluted brain garnished with its veins. This was of the thickness only of post-paper, and seemed to be made up of an inner membrane, and of another, more external, which was vascular, while external to this was a third, by which it was connected with the stroma of the ovary. The other ovary was marked by one or two irregularly-shaped cicatrices, and under the principal was a brainy cyst, of size of a large hemp-seed, and throughout the gland an immense number of small-sized Graafian vesicles in their natural state.

4. Agnes M——, aged 36 years. Unmarried. Had not had a child. General health good. Died of typhus. Catamenia regular, and present ten days before death.

One ovary. Its free edge drawn into a point by a mammillated tumor, almost as large as a small raisin, which gave the ovary a conical form, the tumor representing the apex. This tumor was covered by a thin transparent coating of the outer tunic of the ovary, through which ecchymosed spots and vessels containing dark blood were seen to rest on a ground of a light red colour, and on the point of the tumor was an opening smaller than a pin-head, in which was a minute piece of coagulum. At some distance from this was another similar tumor, but flaccid and smaller, and on the other parts of the ovary were numerous strongly-marked fissures. On dividing the gland, the first tumor was found to consist of an elliptical cyst of nearly half an inch in length, filled with a recent coagulum of blood, its inner surface, formed by the coats of a Graafian vesicle, thickly injected with turgid vessels, but still diaphanous, and not admitting of being separated into laminæ. The smaller tumor was constituted by what had been a large-sized Graafian vesicle, the coats of which remained turgid, but empty and without other changes. An elliptical yellow body, of small size, corresponding with the situation of one of the fissures, was also observed. Nothing remarkable in other ovary.

5. —— ——, aged 22 years. Hymen perfect. Previous period of menstruation unknown, but the inner surface of the uterus had the dark, congested, and vascular look which it has at, and for a short time after, the menstrual period—the minute vessels constituting this appearance being also covered with a white mucus, resembling that found uniformly in the fallopian tubes, and which is secreted also by the lining of the vagina. Ovaries large, and their surface indented and furrowed by numerous cicatrices. Internally were observed two sacs with yellow envelopes filled with blood of an extremely black colour, and in process of absorption; and also, in situation of what was, externally, a recent-looking tumor, of the size of a marrowfat-pea, having the peritoneal coat removed at its most projecting part for about the size of a barley-corn, but without any apparent opening, was a sac consisting of an inner delicate pellicle, and an outer, yellow-coloured, and thick coat, and containing a comparatively recent, but very solid coagulum, the periphery of which was indented with a number of fissures, corresponding to certain irregularities or duplicatures of the inner surface of the cyst, dependent on its begun corrugation.

6. Agnes N——, aged 19; unmarried. No children, and the appearance of the uterus precluded the possibility of a recent abortion. Menses present nineteen days before death. Both ovaries presented cicatrices and ecchymosed spots, the latter apparently more recent than the former, and having their centres perforated by foramina; and one of the cicatrices, around which the ecchymosis had disappeared, had also an opening leading into a cyst, of about the size of a small pea, lined with a very delicate transparent membrane, through which the yellow, or, in this instance, dirty cream-coloured matter on the external membrane was perceived. Adjoining to this was another body, corre-

sponding with the most recent external ecchymosis, with which it was connected also by a foramen. It was of the size of a garden-pea, seemed covered internally by an extremly delicate diaphanous membrane, which was stained with red blood, and veiled a deposit of dirty cream-coloured matter, of the consistence of thin paste, which lay on the inner surface of the yellow opaque external covering of the cyst.

7. —— M'R——, æt. 45. Menses present. Various dark inky points in ovaries, which are of a fleshy consistence, and in the one ovary there is one, and in the other two vesicles, apparently Graafian vesicles, one of them as large as a nut, on which the peritoneum is absorbed to a few fibres, and the vesicles protrude from the ovary, covered only by their proper coats, and filled with an amber-coloured fluid, which coagulates with heat.

8. —— ——, æt. 40. Menstruated two months before death. Uterus large, but healthy. Both tubes shut, and adherent to ovaries. Ovaries large, and marked with indentions, and one of them with two minute vesicles slightly elevated above the surface. Substance of glands gave out fluid from innumerable points when cut, but few vesicles of any size were observable; and in the situation of three of the cicatrices were corresponding yellow bodies without any blood in the centre, but having an accurate miniature resemblance, when cut vertically, to the hemispheres of the brain, both in the whitish, opaque, yellowness of their colouring, and the convolutent indented arrangement of their substance. In the centre of each was a line running in the direction of the length of the body, and filled with what might either be an extremly delicate inner membrane, or transparent lymph. Externally the yellow substance was covered by a delicate diaphanous membrane, through which it shone like a cartilage, and with which it could be dissected from the ovary.

9. —— ——, æt. 25. Menstruated six days before death, which was from fever. Apex of one ovary occupied by a mammillated tumor, perforated near its point by a small circular hole, which, when cut vertically, was seen to consist of a cyst containing a solid coagulum nearly deficient of its red globules, and so consistent as to admit of being cut through its centre, one segment continuing to cover one hemisphere of the cyst, and

the other the other. These latter consisted of a gamboge-yellow matter arranged in slender convolutions, on the interior of a thin indivisible membrane, but no internal lining covering this matter could be detected either by the late Mr. Allan Burns, who gave me his valuable assistance in this dissection, or by my own efforts, after maceration in a solution of alum, and in warm water. No additional layer of membrane could be raised from the ovary in the bed of the cyst, and neither the sac nor the yellow deposit contained any visible vessels.

10. Marion B——, æt. 17. Menstruation of eighteen months' standing, and regular, but last appearance not noted. No child. Habits good. Uterus and its orifice small; its inner surface pale. Ovaries of good size.

Right.—Free edge much denticulated at one point by an old cicatrix, the new matter forming the base of which was equal in size to that of a large split-pea, and through this a very vascular Graafian vesicle, of about the size of a hemp-seed, was seen rising: on opposite side of ovary from this was a second cicatrix, nearly as large as the first, and one or two of smaller size. Corresponding internally in the ovary to the last of the large cicatrices was a yellow, elliptical body, having something of a triangular form, from the conical elevation towards the surface of its upper or external edge, which was also serrated. The internal cicatrix, as it has been named, or line denoting the remains of the former cavity, was very well marked, and contained at one part a minute pale red coagulum. At one extremity of this body, owing to the absence at that point of an interposing internal cavity, the yellow walls of the cyst were about an eighth of an inch in thickness, and consisted of two parallel horizontal folds in close apposition, but quite distinct from each other; while in the other parts, which were traversed by the slender internal cavity, they were, of course, only half the thickness, but their substance in different places was observed to be beautifully injected with red vessels passing from the ovary. Corresponding with the first-mentioned large cicatrix, but deeper in the ovary than the vascular unbroken Graafian vesicle which occupied its immediate surface, and also in the situation of two of the smaller cicatrices, were hollow, corrugated bodies of a white colour, and porous or granular-looking tissue, small, and comparatively indistinct in the latter, but well-defined in the former, and when cut into exhibiting a texture not unlike delicate cartilage.

Left.—Externally, four cicatrices of moderate size, and apparently old, corresponding to one of which, internally, were the remains of a well-marked white body, similar to those in opposite ovary, except that it had not a spherical form, but consisted of rather horizontal laminæ, its layers not gathered up into a little ball, but lying flat. Under another sac was a fawn or light stone-coloured cyst of the size of a split-pea, the walls of which were not thicker than writing paper, and not at all corrugated; the central cavity remaining apparently of its original size, and occupied by a delicate fibrinous clot.

SECTION III.—*Cases in which menstruation, although commenced, had never been regularly established, the individuals not having had children.*

1. Elizabeth C——, aged 17½ years; died of typhus about the fourteenth day. General health not good; menses irregular, but present at commencement of fever. Ovaries large. *First ovary* was destitute of cicatrices, but marked throughout with dark, blue-coloured points, some as large as pin-heads, and others smaller, proceeding from Graafian vesicles under the peritoneal coat; also by one minute scarlet-coloured puncture, in which the peritoneum was as if newly perforated, and by another similar but less recent. Inner surface of gland very fleshy, vascular, and thick, and occupied by vesicles varying in bulk from that of a small dried pea to a pin-head; the vessels in some of them loaded with dark blood. No vestige of a coagulum, yellow or white body. *Second ovary*: outer surface smooth, and without cicatrix. Size constituted mainly by one overgrown vesicle, with deeply congested coats, and by three or four others, some of which were as large as garden peas. No vestige of any rupture having ever occurred was noticed.

2. Marion K——, aged 18; in delicate health for two years, and menstruated only once, six months previous to death, which was occasioned by typhus fever. Ovaries plump, large, and smooth, being marked only by a few puncta, one of which was recent, and of size of a pin-head. No small vesicles had penetrated

to exterior of peritoneal coat, but at one part this membrane was getting thin for about the size of a split-pea, over an enlarged ovisac. Inner surface of both ovaries turgid with vascular vesicles, some of which were just beginning to penetrate the inner surface of the peritoneal coat; of the size of mustard-seed, and many others as large as peas. No trace of a clot, yellow or white body.

3. —— ——, aged 19, and robust. Had menstruated three times only during life, the last time being three months before her death, which was occasioned by fever. Ovaries large and plump, and marked by one linear scar only, which was also faint and doubtful; but their surfaces were roughened with innumerable very minute vesicular elevations, some of which appeared to have burst, leaving shallow open puncta, while under the peritoneum were some dark-coloured ovisacs, making their way to the surface. The interior of both glands was literally crowded with Graafian vesicles of various sizes, many extremely vascular; and corresponding with the external linear scar were the remains of a light fawn-coloured vesicle, all attempts to wash off the colouring matter from the inner surface of which were fruitless; a membrane of considerable consistence, which could be cut, and raised with the blow-pipe, being interposed. Enclosed within the laminæ of the broad ligament connecting the ovaries with the tube, and also in the same situation, but suspended from the ligament by long delicate pedicles, were several vesicles, which contained a granular fluid having molecules, described by Dr. Andrew Anderson, who examined it, as resembling altered blood globules, but not containing any structure like an ovum.

SECTION IV.—*Cases in which menstruation had continued regular for a longer or shorter period, but had been suppressed for some time before death, the women never having had children.*

1. Charlotte B——, æt. 25, a house servant of good character. Menses irregular; was chlorotic, and died of typhus. Uterus small, its walls slender, a minute polypus projecting from inner surface of orifice. Labia healthy.

First ovary, plump and thick; four reddish vesicles of minute size jutting through the peritoneal coat; imperfect remains of three cicatrices with subjacent yellow cysts, one of which could have contained a small dried pea, and had a loose, pulpy, brain-looking inner surface, with a white shining exterior; the others reduced to a smaller size, but exhibiting a white stellated central line, surrounded by serrated yellow matter. A number of small unbroken Graafian vesicles were observed near the surface, and also two small, empty, white coloured cysts, with their coats considerably thinned.

Second ovary contained an immense number of minute vascular Graafian vesicles, some of which were projecting on its external surface, and two had burst, forming red puncta. There were present also the remains of four yellow bodies, one of which was intersected in its long diameter by a central line consisting of the walls of the cyst agglutinated by a thin film of opaque whitish tissue, either its lining membrane or lymph. One white, fatty, or cellular-looking hollow body in ovary.

2. —— ——. Died of a chronic disease. Ovaries small, triangular, and marked externally with old cicatrices which were become faint, and with about a dozen of very minute vesicles, and some points, which were similar vesicles recently abraded and discharged.

3. Mrs. P——, aged 34 years. Died of empyema, and had not menstruated for some months. Known to have had no child. Ovaries of good size. First ovary strongly fissured on its free edge by old cicatrices. No recent scar, but whole surface sprinkled over with clusters of minute vesicles, some as large as a pin-head, their contents fluid, and escaping on being punctured; others seen only by means of a weak magnifier, and gritty, as if the liquid in them had become inspissated and hardened. Inner surface of gland plump, but pale, without any appearance of Graafian vesicles except two or three near the surface, recognised with the magnifier. No yellow substance, but four distinctly marked globular white bodies, chiefly of small size, but capable of being rolled out from their respective situations, were observed.

Second ovary exhibited a few faint fissures in its surface, the indications of former cicatrices, and also one or two fluid vesicles of minute size, but was very generally covered by points so small as scarcely to be seen by the naked eye, grating against the edge of the lancet, and having some resemblance in colour, transparency, and consistence, to crystals of candied sugar. Some of these could be turned out of the shallow cup-like depressions of the peritoneal coat in which they were seated, and rolled about under the finger, or caught on the point of a lancet, and when exposed to heat they shrank and became solid. Inner surface of ovary plump, with several pale vesicles, one being as large nearly as a hemp-seed, and in the peritoneal covering; also, a very white, corrugated, granular-looking body, of about the size of a hemp-seed, situated near the free edge of the ovary, and having a pearly, shining inner surface.

Cases in which positive information respecting the recent suppression of menstruation is not recorded, but which are believed on various good grounds to have been of this kind, the parties not having had children.

4. —— Hawkins, aged 20, a prostitute. *First ovary* covered, in more than a half of its exterior, by adhesions of the tube, and occupied by two or three obscure appearances of scars, and by four or five small vesicles, similar to those observed in children, and having the peritoneum covering them much attenuated. Inner structure of ovary contained a number of small, pale, unbroken Graafian vesicles, some of which were near to the surface; and in the centre of the gland two or three were found empty, and having their coats, which were of very delicate structure, stained of a deep black colour, but without any observable cicatrix or opening in the outer surface of the ovary connected with them.

Second ovary surrounded along its whole circumference by adhesions of the tube. Gland smooth, and without cicatrix. Two small pale ovisacs projecting like blisters from periphery; these were situated in the thickness of the peritoneal coat, having its inner aspect as their inner, and its outer as their external covering, just as under puberty. Two or three small, empty, attenuated nuclei, having their coats dyed black, and without any corresponding cicatrix, were seen in the centre of the gland. No yellow or white bodies in either ovary.

5. ——, aged 19. *First ovary* exhibited, externally, nine cicatrices, all closed and smoothed over as if from age, and several blue macules, which, on opening the gland, were seen to proceed from the presence under the peritoneal coat of unbroken Graafian vesicles, while near to some of the scars were small gamboge or ochre-coloured cysts, with pellicular coats, and no appearance any where of white corrugated bodies.

Second ovary had three scars of old date, and five vesicles, some of them projecting through outer coat. In the centre of the gland was a cyst without any seen opening from it, the walls of which were thin but melanotic, and contained some fibrin of a high gamboge colour; also a small fabiform cyst near the surface, with a thick corrugated outer coat of a deep rhubarb colour. In this the colouring matter could not be lifted out like effused fibrin, and it was arranged on the interior with all the regularity of an organised substance; but no internal membrane could be demonstrated. Some obscure appearances of four or five white bodies.

6. ——, aged about 25, and supposed to have been a prostitute. Os uteri circular and small. *First ovary*: exterior white and polished, with the exception of one or two circular-shaped puncta, and interior contained only a few small and pale ovisacs. The *second ovary*, with the pavilion and about half of the tube, were enclosed in a covering of broad ligament. Near to the edge of the tube, but more than half an inch from the ovary, a moveable hard tumor of about the size of a raisin was discovered, and, till exposed, was supposed to be the ovary. It was easily enucleated, having no organic adhesion except at one end, where it was bound by a pedicle, and was found to be a hollow cyst of very white cartilaginous tissue, of an irregular oblong or kidney shape, having a scabrous, indented, or fissured, and convoluted surface. It was three, or perhaps four lines in thickness, and could not be separated into laminæ, although its outer surface seemed covered here and there with a delicate pellicle. Its inner surface, which was deeply fissured, was painted with a bright yellow substance, of the consistence and appearance of inspissated honey, which having no interposing pellicle, could

easily be rubbed off with the finger. The internal cavity was as large as a garden pea, but reniform. The tissue interposed between this body and the ovary had imbedded in it a number of unburst vesicles of various sizes, having very pale coats. Interior of ovary also pale, with scarcely an ovisac apparent to the naked eye. There were no vesicles in the vicinity of the opposite ovary, the tube and ligaments of which were normal.

7. ——, 45 years of age. One ovary much marbled with inky stains of various sizes, and of a circular form, having their centres constituted by a white spot, which might be a small sized cicatrix, or by a spiracular lesion of the peritoneum; and internally the gland was occupied chiefly by one very large ovisac, admitting of the demonstration of three coats—one connected with the stroma, and the thickest, another pellicular, and the innermost so delicate that the fluid contents transuded by mere handling. The other ovary was covered with numerous shining solid points, something like the germs contained in the roes of the smaller fishes, and its interior was occupied by similar bodies, many of them, however, of large size. They appeared to be ovisacs.

SECTION V.—*Cases in which the subjects had outlived the menstruating period of life, and were without children.*

1. Mrs. G——, aged 50. Uterus about one and three-fourths inches in length, but with all its parts symmetrical. *First ovary*: external surface nearly smooth to naked eye, but with a simple magnifier it was found occupied by numerous pores from which a transparent fluid escaped on pressure, and at one point there was a distinct minute vesicle, similar to those observed in children. Inner surface exuded transparent fluid freely when cut, and was occupied by numerous miliary vesicles, some observable with the naked eye, and vascular, others only with a magnifier, and destitute of red vessels. *Second ovary*: outer surface smooth, and free from cicatrices of ordinary kind, but occupied by about a dozen minute vesicles, some easily observed with naked eye, and others with the magnifier, and also by several pores or capillary sized puncta, which appeared to proceed from vesicles of the same kind which had burst and discharged them-

selves. Inner surface of ovary sprinkled with many very small Graafian vesicles, but no appearance in either gland of any yellow or white body.

2. Mrs. ——, aged 70. No lineæ albicantes anywhere, or fissures in os uteri. *First ovary* size of a large kidney-bean, smooth, and of a very white colour, without cicatrices, but having two distinct blisters or vesicles, each of the size of a small segment of a pin-head, and filled with fluid. Interior of gland exhibited two distinct whitish-yellow, fatty-looking bodies, of size of a large hemp-seed, with traces of some others; and, in addition, various slender globular shaped Graafian vesicles (best seen with a magnifier), which were filled with transparent fluid. *Second ovary* of similar size, but more irregular shape; surface white, with exception of three or four vascular points, at one of which there was an indistinct appearance of a minute pellicular vesicle, and at another of a punctulated solution of the continuity of the peritoneal coat, and from the surface of this as well as of the first ovary a transparent fluid exuded on pressure. Inner surface occupied by many Graafian vesicles filled with their usual contents, some having their coats injected with red blood, but more generally white; and at one point near the periphery, there was an appearance as if a vascular vesicle of about the size of a pin-head had burst, and had blood effused into its cavity.

3. Christian M'W——, aged 50. Hymen entire; both ovaries sunk in size, and deeply fissured and indented in all directions, by remains of cicatrices now representing lines, some occupying the whole length of the glands, and others their small diameter. The inner surface was vascular, without any traces of vesicles, yellow or white bodies. The glands seemed to be absorbed to their fissured and corrugated peritoneal covering, lined with a thin vascular coating.

4. ——, aged about 50 years. No appearance of having borne children. Ovaries much shrunk, and indented with cicatrices, corresponding to which were two or three whitish-yellow points, of a miliary size, one of which was distinctly hollow, the structure soft and delicate. No Graafian vesicles present.

5. Examined the fallopian tubes of a woman aged 71 years. Air was made to traverse both, on application of moderate power, although, in one of them, with difficulty.

PART II.

DISSECTIONS OF THE HUMAN OVARY IN INDIVIDUALS WHO HAD BEEN PREGNANT, THE OVARIES BEING EXAMINED AT DIFFERENT PERIODS OF UTERO-GESTATION, OR AFTER DELIVERY.

SECTION I.—*Ovaries of parties either supposed or really pregnant, examined before the completion of gestation.*

1. M——, a very robust woman, brought into Fever House speechless, and died in twenty-four hours. In the uterus, which was not, however, more than usually vascular, was a cyst, of the size of a raisin, connected for about a third of its periphery with the anterior wall immediately above the cervix, from which it could be easily separated. Viewed with a common magnifier, it appeared to be a thin vascular bag, containing fluid, and enclosing, at its lower part, a circular vesicle, of about twice the size of a mustard-seed, while, throughout the cavity of the uterus, there was a considerable layer of dirty-looking jelly-like substance. Both tubes were very vascular, and full of the fluid found in them generally, having the colour and consistence of semen masculinum, or thin arrow-root, diffusible in water, and, examined by the microscope, consisting of innumerable very minute globules, aggregated into masses generally of an oval form, and differing specifically in appearance from the globules of blood, or pus.

First ovary exhibited, at one part, an old cicatrix, covered by a very thin white pellicle, and, at another, a small orifice, from which fluid escaped on pressure; and, corresponding with the former, there was, internally, a thin empty vesicle, with inky coats, and with the latter, a more recently burst and vascular flaccid vesicle.

In the *second ovary,* the tube of which was larger than the other, more vascular, and better filled with white fluid, which could be made to flow out copiously from the pavilion, there was an apparently recent opening, leading into a cyst of the size of a swollen garden-pea, filled with a clot of florid blood, and which consisted, first, of a distinctly-marked, delicate, transparent membrane as an outer capsule, exposing on its removal a granular-looking, whitish-yellow substance, enclosed within two other very delicate membranes, one being externally in connection with the capsular investment, and the other internally in contact with the clot. Viewed from without, this substance had a convoluted look, and shone through its pellicular external covering precisely as the convolutions of the brain do through the arachnoid. The pellicle was painted with exceedingly minute vessels, filled with florid blood, and in the sulci of the convoluted body were blue or dark coloured points, resembling very much the appearance presented, so far as colour and general effect, or contrast with the whitish convolutions is concerned, by the veins of the brain; while, viewed from within, the granular aspect and whitish colour of the convoluted body were exchanged for the appearance, as seen through the inner pellicle, of a uniform coating of an ash colour.

2. Preparation 367 of R. R., Glasgow Hunterian Museum.

A fallopian tube conception at about the sixth week, with ovary of same side opened vertically along its centre. Situated deep in one of the segments of the ovary is an empty Graafian vesicle, which would admit a garden-pea, and on opposite segment is a small portion of the walls of the vesicle laid back. These are lined by a thin pellicle, which, at the bottom of the cavity, is indented into delicate grooves, without displaying any other appearance than might be supposed to mark an unbroken Graafian follicle of large size laid open by the knife in dividing the gland. External to both divisions of this cavity, and in each hemisphere of the ovary, are the segments of two long lemon-coloured bodies, of the kind described in this paper as cephaloid or cerebriform bodies, having the yellow matter traversed along the long axis of each by a white opaque line, formed either by thin internal pellicular lining membrane, or by lymph.

3. Preparation 52a of R. R., Hunterian Museum.

A uterus with both ovaries laid open, the inner surface of the former rough, and described in catalogue as a gravid uterus, and the latter as containing five corpora lutea, and some vesicles. In one of the largest of the former bodies contained in the right ovary here is a pellicular lining covering a thin film of convoluted yellow matter lying on the outer coat, which is thickened; but no contraction has occurred in this, or, with one slight exception, in any of the other cysts, which, as examined without dissection, appear to consist simply of an outer thick coat, having a delicate pellucid lining.

4. Mrs. C——. Had not menstruated for three months. Symptoms of menstruation, or of abortion, two days before death, of fever. Uterus slightly enlarged, and what was supposed to be a portion of decidua projected from its orifice. The left side of its inner surface was quite smooth, and free from any membrane; but in the right cornu, and adjacent to the extremity of the tube, was a vascular opaque bag, of nearly two inches in length which contained loose blood only.

Right ovary. Externally, two small orifices, both permeable to a bristle, but old: some cicatrices, and several shreds of recent fibrinous tissue, the result of inflammation. Internally, one of the foramina communicated with a cyst consisting of a delicate inner membrane, and a thin layer of convoluted, brainy, yellow, exterior substance, and containing a coagulum of red blood. The other foramen was connected with a similar cyst, but having its blood absorbed, and its coats of a coal colour.

Left ovary almost generally enveloped in a fine expansion of new tissue, and the corresponding tube, though pervious, was adherent to two hypertrophied Graafian vesicles, each the size nearly of a hazel-nut, which protruded from the free edge of the gland. The surface of this latter was smooth, and without any visible foramen, and at one part was elevated into a nipple-like point, of the size of a marrowfat-pea, on cutting into which a rapid squirt of fluid, apparently reddish serum, escaped from it, and a cyst consisting of a large bed of convoluted, or granular, fatty-looking, yellow, brain-like substance, came into view, communicating, as was now ascertained, with the exterior by a minute opening, through which a bristle was introduced. In the interior of this cyst, but without any organic union with it, was a substance which resembled very strongly an empty Graafian vesicle, the walls of which had become opaque, thickened, elastic, and corrugated.

5. Mrs. P——, mother of several children; three months pregnant. Aborted during fever, of which she died. Uterus

enlarged to about twice its unimpregnated size. Orifice about an inch in length, and admitting finger with facility. Tubes filled with white fluid, the left being perceptibly larger than the right. Ovaries longer and narrower than usual.

Right.—Had externally three cicatrices with ecchymosed and still tender surface, the most recent perforated by a small foramen, which led into a partially obliterated yellow cyst, containing blood.

Left.—Proximal extremity occupied by an old cicatrix, and distal by a tumid and slightly vascular appearance, surrounding a capillary sized opening, having in its vicinity two minute vesicular elevations, like those which are seen under puberty, or during suppressed menstruation. A little transparent fluid oozed from the opening on the introduction of a bristle and on cutting into this there was exposed a circular cyst, of the size of a marrowfat-pea, within which, but without any organic or other connection with its inner surface, was a whitish globular body, resembling in its aspect an empty thickened vesicle, and in its tissue the fibrin of the blood having the colouring matter absorbed. The cyst itself did not appear to have begun to diminish in size, and was of a rhubarb colour, its walls consisting of a delicate pellicle, covering the yellow matter, and not differing in respect to general appearance, thickness, colour, or structure, from those of the same bodies in the unimpregnated state.

5a. Preparation 182, R. R., of Glasgow Hunterian Museum.

A uterus between the third and fourth month, injected yellow and black; the child seen through the amnion with its head pressing against cervix uteri. Right ovary contains a large triangular cyst in its free extremity, which consists of a cavity nearly the size of a small grape, lined by an opaque membrane, which, examined from its interior, has the appearance of a cobweb-like pellicle, and at its cut edges, and, as seen through the glass, that of a soft tissue, of about the thickness of silk paper, or of the amnion membrane; and exterior to this is a bluish, opaque, and, in some places, faint yellow-coloured, annular portion, of about the eighth of an inch in diamater, of a very delicate structure, permeated by black and yellow vessels, some of which have given way. No corrugation of the cavity has taken place.

6. —— ——. Abortion at the fourth month; and death in a few days from fever.

External surface of ovaries pale; and exhibited some nearly faded cicatrices, and a few very minute, transparent, vesicular points, embedded in the peritoneal coat, along with others of a somewhat larger size, the vessels of which contained blood. The interior of the ovaries presented many similar ovisacs, and one thin empty vesicle, the coats of which remained dyed yellow and black. The only other appearance was that of a fabiform, cephaloid body, seven lines in length, situated along the free edge of one of the ovaries, which, when cut through its centre, displayed in both of its segments a lateral fold of yellow matter from one to two eighths of an inch broad, agglutinated in the middle, or the long axis of the body, by a white opaque line. The external investments of this body were of the most delicate description, and when separated by gentle tearing with the forceps under water, one pellicular coat covering the external aspect of the yellow matter was all that could be demonstrated. In the yellow matter itself no blood-vessels were detected; and on separating the white central line, each segment of the body opened up into a cavity lined by a cobweb-like membrane, constituting, when viewed unitedly, a cephaloid cyst identical with those found in the virgin female.

6*a*. Preparation 180, R. R., Glasgow Hunterian Museum.

A uterus about the fourth month; the veins injected black, and the arteries red. A body in one ovary, formed of a semi-opaque fawn-coloured portion, interspersed by vessels, and encircled by an irregular ring of veins particularly; while, from within, it has several white striæ penetrating it from an internal cavity, about the size of a pea, which is lined by a dense white membrane, the cut edge of which is nearly of the thickness of the paper called Bristol board.

7. Mrs. ——, seven months pregnant; died of apoplexy thirty hours after delivery.

Surface of both ovaries covered with a great number of minute red vesicles; and in each ovary there was a corpous cephalodium of the size of a pea, one of which, near which were the remains of a recent cicatrix, was fresher looking than the other; but both presented the convoluted brain-like matter seen in the unimpregnated female, only in a more plump, vascular, and organised state. The inner surfaces of both bodies were agglutinated together by an opaque, unorganised, cobweb-like, but consistent matter.

Unbroken Graafian vesicles, in various states of advancement, but all small, were seen in both ovaries.

8. Mrs. C., a phthisical woman, aged 25; seventeen hours delivered of a living child at seventh month.

Right ovary was large, and faintly marked with numerous superficial fissures; also with a very vascular cup-like depression, consisting of a hard florid ring, surrounding a dimpled point, showing a healed foramen in its centre. Another hard pisiform body, with a few vessels on its peritoneal covering, and at a little distance from it a deep cicatrix, having two minute red vesicles projecting from its surface, were the only other external appearances. Corresponding to the first-mentioned tumor there was, internally, a cephaloid cyst of the usual appearance, but enclosing within it a dense, opaque, empty vesicle, similar in structure to the corpora albida. The second tumor was constituted by a body having a remarkable massive development of the brain-like matter, but destitute of an internal opaque coat, or enclosed cyst; and under the deep scar of the exterior was a white body in process of absorption; and through the gland, numerous undischarged vesicles of various sizes.

Left ovary marked externally by Graafian vesicles of small size, either approaching the surface as bluish maculæ, or recently burst, and leaving a superficial blistered surface. Interior contained numerous vesicles, and two white bodies.

9. Preparation 52, R. R., Hunterian Museum. A woman who died undelivered in the ninth month of utero-gestation.

Ovaries contained three bodies, described in catalogue as corpora lutea. The uppermost is of an oblong form, and has a convoluted but very white tissue, with a deciduous or flocculent lining, and seems to be a cerebriform body deprived, by long immersion, of its colouring matter. The other two consist each of a central cavity, an annular coloured portion, and a thin capsule. The largest has a cavity of the size of a pea, which is surrounded by a dense, striated, reddish, stone-coloured matter, of about one-eighth of an inch thick; and the other is smaller, and the coloured ring, which is of about the same thickness, is of a bright yellow or orange colour, and is lined by an opaque white membrane, resembling the corpora albida of this paper.

10. A preparation belonging to Dr. Paterson, Professor of Midwifery, Anderson's Institution. A dropsical woman, who died of apoplexy in ninth month of pregnancy.

Ovaries large, and circumference of each copiously studded within and in the peritoneal coat with small-sized vesicles. Cicatrices nearly effaced from exterior. In one of the glands there was nothing else observable, but in the other there was an extremely white, convoluted, elliptical body, without a cavity, being the remains of a thin, brainy cyst, bleached by long maceration; and adjoining it was a globular body of the size of a recent marrowfat-pea, which had been divided through its centre, and which consisted of a cavity as large as a dried pea, lined by an extremly dense white membrane, and surrounded by a ring of light fawn-coloured matter, the periphery of which seemed circumscribed by imperfect traces of an investing capsule.

On more careful examination, the existence of such an investiture could not, however, be demonstrated; and the annular portion, which was of about the thickness of sheep-skin, presented an obscure linear, and, in some parts of its outer margin, a very well-marked brainy or convoluted appearance; and the internal lining or cyst was seen to have its general surface slightly furrowed and scabrous, as if from corrugation. This latter portion was easily separated, at its cut margin, from the exterior fawn-coloured or granular substance, and, on lifting it up, was found to consist of a very firm tenacious tissue, identical with that of the 'dense white bodies' of these descriptions, and to have interposed between it and the fawn-coloured ring another, but much more delicate, although a very distinct and beautiful, layer, which could also be raised from the granular matter on which it lay.

11. A girl, aged 24. In latter end of ninth month of first pregnancy. Died undelivered, of extensive chronic disease, and discharge of blood from stomach and bowels. Placenta attached to left cornu.

Right ovary somewhat lengthened and narrowed; external surface smooth; internal exhibited one white body, and numerous small vesicles, many of which were near the circumference, some elevated above it, one or two of which, as if recently discharged, left minute superficial openings.

Left ovary.—Periphery smooth and free from cicatrices, with the exception of a number of elevations of small vesicles, and one or two capillary-sized shallow openings. On uterine end of gland was a tumor as large as a small raisin, of firm contexture, and having two varicosed tortuous vessels, filled with dark blood, traversing it externally, and a small foramen in its centre. On cutting this in two, its segments were found of a kidney shape, their circumference consisting of a fibrous tissue having its fibres running obliquely across, and of a pale slightly yellowish colour, which, on exposure to the air, became redder, and assumed something of a fleshy or pale muscular look. The transverse diameter of this ring was about an eighth of an inch; its inner surfaces were separated merely by a curved sulcus, lined at its bottom by an opaque pellicle, which presented the appearance of a white streak, bisecting the more central portion of the body in the direction of its length.

11*a*. Preparation 43, R. R., Glasgow Hunterian Museum.

Ovarium with a portion of gravid uterus adhering. The tube is distended with spirits, and is larger at the end next ovarium than the barrel of a writing pen. Ovarium slit open shows a body of size of a hazel-nut, with a cavity nearly as large, formed by an opaque, white, dense looking membrane, which is surrounded by a ring of shining, yellowish coloured, granular matter, of considerable consistence. Through the kindness of Professor William Thomson, the preparation was removed from the spirits and examined, when, at a point in the cut edge of the smaller segment of the ovarian cyst nearest to the surface of the ovary, the membranous body forming the walls of the cavity was found to consist of an internal thick, dense, white layer, lying on a distinct and well developed, more external, but much thinner coat, on the outside of which the solid granular matter was seen to be deposited.

11*b*. Preparation 176, R. R., Glasgow Hunterian Museum.

A section of uterus and placenta adhering. The cells of the placenta injected red from the vessels of the uterus. Ovary contains a body surrounded by a ring of injected vessels, and of size of a large garden-pea, which is formed of a quantity of extremely solid and beautiful yellow granular substance, enclosing a compressed angular-shaped material of about the size of a grain of wheat, having the colour, consistence, and appearance of one of the white bodies of the ovary, occupying the cavity of the cyst, and squeezed together by the growth of the external granular tissue. None of the blood-vessels of the yellow substance penetrate the body, which, although in close mechanical apposition with its adventitious covering, and having one or two delicate processes shooting into its structure, and on these accounts is so firmly wedged as not to admit of being separated with any moderate force, is yet not organically connected with it.

SECTION II.—*Ovaries of women who died within one month after delivery at the full period.*

1. —— ——, a young woman, who died of peritonitis, &c., a few days after delivery. One ovary was larger than the other, and, on rubbing it between the fingers, a flat circular hardness, of about the size of a dried pea, was perceived, having its outer surface slightly umbilicated by the remains of a small triangular cicatrix. On dividing this tumor it was seen to consist of a contracted circular cyst, the walls of which were of a very faint yellow colour, and of an obscurely radiated or linear structure, bounded on their outer margin by what appeared like a distinct membrane, and, more externally, by an investment of stroma; while, internally, there was an opaque central point, of the size of a pin-head, having a puckered stellated look, as if from the shooting out of various prolongations among the folds of the yellow matter.

Second ovary pale, and destitute of vesicles, except at its distal extremity, where a number were clustered around an hypertrophied follicle, some projecting on the inner, and others on the outer surface of this bag, which was of the size of a grape.

2. M. C., married, and mother of a family. Death eleven days after parturition at full time. Both ovaries smaller than natural, and former cicatrices nearly faded. In one of the ovaries nothing was visible except a vesicle of the minutest size on the surface. In the other there was the same destitution of

ovisacs; but the tubes and broad ligaments of both had several vesicles of a very delicate structure embedded in them; and in this ovary was one white body of small size, and also another body, which, when penetrated, gave issue to a little green fluid, and was found to consist of a thick, very white and shining inner membrane, surrounded by a more delicate capsule, which was of a green colour, as if dyed by the effused fluid. After maceration for a couple of days in alum water, the dense white and glistening inner membrane could easily be insulated, when it appeared of the bulk of a pea, of the thickness of thick post paper, incapable of division into laminæ, and diaphanous, except here and there, where it was more obscure. The bed of ovary from which this body had been raised was now found to exhibit some traces of the greenish colour, and to consist of an internal pulpy and delicate lining, which had been in immediate apposition with the exterior of the removed body, and of another stronger membrane, from the outside of which irregular and imperfect laminæ of stroma could be separated. The pulpy appearance of the inner membrane seemed to be produced by the presence of minute sparse points of a more condensed tissue, like granular or cephaloid matter, deposited on its exterior.

3. —— ——, 22 years of age. Death from acute pleuritis and empyema, three weeks after delivery of first child.

Ovaries large, plump, smooth, and pale, with the exception of three nearly faded old cicatrices on one, another having a foramen, and several black points from Graafian vesicles advancing to surface. On cutting through the centre of this foramen, a body of about the size of a large garden-pea was observed, having a white pellicle in its centre, and its periphery covered by a similar investment, the body itself consisted of a ring of about an eighth of an inch in thickness, of a red, inclining at margins to a somewhat yellow colour, of an oblong shape, and not distinguishable from the other parts of the ovary, which were all of a very red colour, except by its defined shape and deeper dye, it being destitute of any fibrous or of any convoluted appearance, and being situated between the two pellicles mentioned, but not having, either in them or in itself, any stellated configuration.

Three minute points in other ovary; one of a bright yellow, another white, with a small portion yellow, and the third a transparent pellicle enclosing a black point, apparently blood, decomposed and nearly absorbed. Numerous small Graafian vesicles in both ovaries, but no capillary-sized foramina from these bursting on the surface could be detected.

4. —— ——. Died of phlebitis, three weeks after delivery at full time. Ovaries not affected by disease. Subject delicate.

External surface of both glands pretty copiously set with transparent eyes or points, some as small as the larger grains of sand, and others of the size of millets. Some had burst, leaving minute colourless pores in the peritoneal coat; in others the puncta were scarlet coloured, and each had a very delicate areola of the same hue; and in a third variety the blood in these areolar capillaries had been decomposed, and the parts had a sooty appearance, the discolourations being more or less annular, and having slender openings in their centres. In other respects the ovaries were smooth, the linear cicatrices of the menstruating period being nearly effaced. In each ovary was a cyst of the size of a swollen garden-pea, consisting of an extremly white, dense, internal membrane, with polished but fissured inner and outer surfaces, arising from a degree of corrugation. This membrane was of the thickness of parchment, diaphanous, and had interposed between it and the substance of the gland, in both cases, two other delicate but distinct membranous layers, without their being a vestige of granular matter on either, or the possibility of raising any more laminæ from the ovary enveloping them, or of distinguishing any difference in the structure or degree of organisation of the two. She had been delivered, under the superintendence of Dr. Pagan, the Professor of Midwifery in the University, of a single child.

5. Mrs. ——, aged 26. Had a child four weeks before death from chronic visceral disease. Placenta, a portion of which in a friable pulverulent state remained, had adhered to posterior part of right cornu. Both tubes glued to ovaries, which were small and corrugated. A comparatively recent cicatrix was seen in right ovary, corresponding to which, internally, was a circular ring of rose-coloured tissue, which became very florid on the access of air, and consisted of a fibrous structure of about two lines in thickness, with a transverse oblique

arrangement of its capillary-sized fibrils, something like what obtains in the walls of the left venticle of the heart. Within this body, but not adherent to it either by vessels or prolongations of itself, was an opaque, yellowish-coloured hollow membrane. A vesicle, similar to what is often seen in the broad ligament, was found, a little distance from the ovary, within the folds of this membrane, and adjacent to the portion of fallopian tube, the pavilion of which adhered to the ovary: this appeared in every respect like a Graafian vesicle which had passed from the ovary to its new situation by interstitial absorption; and, when laid on a piece of glass, cut into two, and examined by Dr. Rainy, Professor of Medical Jurisprudence in the University, with the microscope, it was found to contain a granular membrane and an ovulum.

SECTION III.—*Ovaries of women who died within, or at, two months after delivery at the natural period.*

1. —— ——, aged 37 years, and mother of seven children, the youngest five weeks old. Uterus enlarged about a fourth; cavity large, and dyed with blood. Sinuses enlarged. Os uteri black, and epithelium abraded. Spermatic veins much varicosed, and occupied by laminated coagula arranged in spiral coils. Ovaries smaller than medium size, pale, and nearly smooth, particulary the *left*, which was also smaller, and which exhibited externally two small, raw-looking, and vascular, abraded spots of a minute size, as if occasioned by the rupture of small vesicles, which had arisen above the surface of the peritoneal coat, and been discharged. Inner surface pale, with some very small Graafian vesicles in its parenchyma, but no rose-coloured, yellow, white, or black body.

Right ovary about medium size, with remains of four or five large-sized cicatrices, and the appearance of a number of miliary Graafian vesicles, many of them near and some within the inner surface of the peritoneum; while others had penetrated the entire thickness of this membrane, and remained either with a segment of the size of a small pin-head protruding externally, or had given way and been discharged, leaving puncta of a red colour.

No vestige of any other form of ovarian body, except at one point, where there was an ill-defined corpus albidum.

2. —— ——, died of suppuration in uterus, &c., six weeks after delivery of what was said to have been her first child. Ovaries unaffected by disease. On one there were two cicatrices, one very well marked, and the other less, and a minute red point, as if occasioned by the adjacency of a Graafian vesicle; and on the other there was an indentation or central hollow point, surrounded by an annular condensation of the ovary. On laying the latter open, an elliptical cavity, corresponding to the central dimple or depression, lined by a white opaque pellicle, and surrounded by a condensed, extremely white, and somewhat gristly oval ring, in the situation of the external hardness, came into view, and for a moment was supposed by Mr. Allan Burns, who assisted in the dissection, and by me, to be the vesicle from which the fecundated ovum had been discharged.

On cutting through the centre of the principal cicatrix in the other ovary, however, a body was brought into view corresponding also, with a feeling, externally, of a tumor, of about the size and shape of a dried pea, having a central white opaque membrane or pellicle, not admitting of division into layers, or exhibiting any appearance, when examined with this view in the most careful manner, and in different ways, of being capable of such division, but being about the diameter of a mustard-seed, and having white streaks proceeding from it into the substance of a ring, about an eighth of an inch thick, of a pale brownish or slightly reddish colour, having an oblique linear arrangement of its fibre, and a structure, in respect to consistency and colour, resembling the reddish, horny, condensed cuticle which surrounds some clavi. External to this ring, which became redder, and more like to pale muscle, on exposure to the air, there was a distinctly circumscribed white delicate ring of capsular investment.

The differences between the body just described, and that contained in the other ovary, were the smaller size of the central cavity, the more organised state of the ring, the presence in this of red fibres, and its shining, horny, and yet muscular look, intersected on its inner margin by white striæ from the inner pellicle, and surrounded by a well-marked capsule of opaque membrane.

3. Mrs. C——, death eight weeks after accouchement of her third child.

One ovary.—A cicatrix, behind which was an elliptical body of about the size of a small pea, enveloped in a capsule, and presenting, when divided internally, a pulpy matter, which resembled in consistence the inner surface of the cephaloid cysts, only of a marked red colour from its great vascularity. Cavity obliterated. Six corrugated, hollow, white bodies in the two glands.

4. —— ——, aged 22. Death from suppuration in joints of pelvis, &c., eight weeks after birth of second child, the first being four years previous.

Right ovary larger than left. External surface marked with some nearly obliterated cicatrices, and the porous remains of some minute vesicles which had burst and been discharged. Subjacent to one of the nearly obliterated large cicatrices was an elliptical, slightly corrugated, and very white empty cyst, of about the size of a hemp-seed, the inner surface of which was of a shining pearly whiteness, destitute of any appreciable inner layer, and the whole thickness of its substance not more than that of thick paper.

In the *left ovary* were two bodies of a similar construction, but smaller and globular; they were whitish, empty, corrugated hollow cysts. In both ovaries there were a few small vesicles, filled with dark coagulated blood, but without any thickening of their coats. No other body of any kind.

5. —— ——, aged 37 years. Mother of four children, youngest of which two months old at death. Ovaries white, and although retaining the vestiges of numerous cicatrices, these were superficial and smooth from age. No appearance of Graafian vesicles either on surface or in texture of glands. One ovary contained a body of an elliptical form, and of about four lines in length, and nearly three in breadth, having a horny-looking, grey, semi-transparent, striated circumference, enclosing a minute, angular, or stellated, white-coloured central portion, or line. The striated marginal, or annular structure had much resemblance, in linear arrangement and fleshy colour, to the human nail as it rests on the subjacent pulp of the finger, and, when viewed by transmitted light, its tint was seen to

depend on the presence of red vessels, and the striæ of its inner margin on the intersections of minute processes of the inner membrane. This latter, similarly examined, was translucent, and consisted of a distinct delicate membrane, forming a minute cavity. Two white bodies in ovaries, of a yellowish fatty look, with external convolutions.

SECTION IV.—*Ovaries of women dying from two to three months after delivery at the natural term.*

1. Mrs. ——, aged 44 years. Youngest child ten weeks old. On *one ovary* was a recent but thoroughly skinned cicatrix, and another which permitted a bristle to pass a very little way; and internally, there were various empty white cysts, from the size of a hemp-seed to that of a grain of mustard, two of which were connected with the recent scar and foramen. Gland two inches long by one broad.

Other ovary a third smaller. Remains of one large cicatrix. A minute vesicle and some punctuated abrasions of peritoneum on external surface, and, internally, some very small but full Graafian vesicles. A number of white cartilaginous-like hollow bodies, all of small size, and one very little cyst with thin unchanged coats, but filled with clotted blood. No vestige of any other body.

2. Mrs. R ——, aged 36. Death from typhus three months after birth of ninth child; being previous to fever in bad health. Ovaries of good size. *One* exhibited two small vesicles near to surface, and five cicatrices, old, and nearly filled up. On opening one of these, which was still raw, an empty Graafian vesicle was seen behind it, of nearly the size of a barley-corn, but without abnormal vascularity or thickening of its coats, or any clot.

Other ovary paler and smoother than the first, with two or three ecchymosed spots, as many faded scars, and one minute projecting vesicle; while, internally, the only things noticeable were some vesicles, and the imperfect remains of three white hollow globular bodies.

3. Mrs. M‘——, aged 32. Eight children, youngest three months. Ovaries showed traces of old cicatrices, and in *one* of them, on which were also seen some small vesicles, these scars

were more deeply indented than in the *other,* in which there were only some distended vesicles, and an obscure appearance of two 'white bodies;' while in the first there was, 1st, in centre of gland, a thin vesicle, and without any seen connection with a scar, having its coats dyed with a snuff-coloured paste of disorganised blood, which still lay on it. 2nd, a white body; and 3rd, a solid, well-defined, oval body, which consisted of an external ring of very vascular, fleshy looking substance, as red as muscle, and a central opaque line.

SECTION V.—*Ovaries in individuals dying four months after natural delivery.*

1. Mrs M'——, 35 years of age. Mother of six children; second youngest six years of age; youngest at breast four months old. Surface of *one ovary* white and smooth, with exception of superficial remains of a cicatrix, and several transparent vesicles of a very minute kind. On cutting through the former, a solid body, somewhat larger than a hemp-seed, came into view, of a reniform shape, with an elliptical central portion of about the eighth of an inch in breadth, of a whitish, opaque colour. This, which seemed to be the corrugated remains of the inner layer, was bisected in its long axis by a more translucent line, formed apparently by lymph, which had agglutinated its inner sides, and obliterated what was left of its cavity, while its circumference had a serrated arrangement, occasioned by delicate processes of itself shooting into an annular, more external body, of a transparent, fibrous, and delicate muscular looking tissue, and of a faint reddish colour, which, in its turn, was invested with a capsule, from which red vessels penetrated to the annular portion.

Other ovary filled with unbroken vesicles, and contained also an empty follicle of the size of a pea, having its coats, which remained thin, painted internally with a thin coating of yellow matter supposed to be decomposed blood.

2. —— ——. Mother of two children; youngest sixteen weeks old. The *one* ovary exhibited one or two faint cicatrices, and the *other* the remains of a circular abrasion, of the size of a small segment of a dried pea, in which was a foramen leading

into a cyst of the bulk of a garden-pea, which contained a clot of blood as large as a hemp-seed. The inner surface of this sac consisted of a yellow pulp, of considerable thickness, which could be scraped off, leaving a vascular envelope, itself surrounded by a capsular investment, and which two, unitedly, resembled one of the white bodies. There was a similar cyst, but only half the size, and empty of blood, in the opposite side of the gland, and the other ovary contained minute miliary ovisacs only, although these were abundant.

3. —— —— had a child sixteen weeks before death. Both ovaries white, and free from old linear scars, there being present only two or three recent minute pores in the peritoneum, and on each gland a reddish or rose-coloured spot, and some hardness; corresponding to which there was, in the one ovary, a circular solid mass as large nearly as a small dried pea, having a reddish colour, and a white, stellated, circular centre; and, in the other, an empty Graafian vesicle with thin coats and a yellow deposit on inner surface, and several melanotic spots, or corpora nigra.

4. —— ——, aged 37 years. Seven children; youngest four months old. Ovaries well developed.

One ovary. Peritoneal coat smooth, and presenting at several places vascular spots, each of the size of a pin-head, which were found to proceed from turgid Graafian vesicles escaped from the parenchyma, and lying with thin naked coats immediately under the surface, which was diaphanous. At two points of this kind the peritoneum was absorbed for about half the extent of the subjacent vesicle. Internally, the gland was very full of large vascular vesicles, and a circular hard body, moveable in the stroma, and of the size of a small pea, exhibiting when cut the whitish yellow, shining, cartilaginous tissue of the corrugated empty cysts, which I have called dense white bodies, was seen.

Other ovary presented two dark spots indicating subjacent unbroken Graafian vesicles moving to surface, and a third in which a minute portion of the hemisphere of a vesicle had already risen above the level of the peritoneal coat; also, a transverse groove across the free edge of the gland, arising from the protrusion of the half of a circular body of a cartilaginous appearance, being, when cut into, hollow, empty, of a vascular tissue, and of a dull whitish red colour; also, immediately adjacent to this was another circular, small, flat, hardness, which was connected with the presence of an empty, hollow, very white body, which was not vascular.

5. —— ——, aged 24. Child four months old. Inner surface of cavity of uterus occupied by a highly injected vascular network, which was painted over with a thin layer of the white fluid of the tubes, which also were very vascular.

Right ovary exhibited two points, at each of which a minute segment of an unbroken, vascular, miliary sized Graafian vesicle was seen presenting through a foramen of the peritoneal coat; also several small cicatrices and hardened points, under which, internally, were white bodies of the size of mustard-seed.

Left ovary.—Two very strongly marked, but old cicatrices, corresponding to one of which was a solid shining white body, and to the other, an ink-coloured thin vesicle, with its inner membrane gathered up into delicate rugæ.

SECTION VI.—*Ovaries in women, five, six, seven, ten, twelve, and thirty-six months after natural delivery, menstruation not having been re-established.*

1. Mrs. J——, aged 40. Mother of a family, the youngest being five months old. Ovaries large. Two or three minute vesicular points, and some remains of cicatrices, and a few vascular macules, on exterior. Interior of both occupied by several vesicles, one or two of which were as large as small dried peas. In one ovary were the fragmentary remains of an opaque cyst, and in the other, a globular-shaped cartilaginous looking body, of the size of a large hemp-seed, of a bright canary yellow colour, and corrugated irregular surface, surrounded by a well-formed capsular covering, from which it could be easily enucleated, its only observed organic connection being a minute pedicle. The capsule, also, with a little gentle pulling, was raised from the ovary in the form of a well-organised membrane, resembling the hull of a garden-pea.

2. Mrs. M——, aged 35 years. Mother of five children, youngest being six months old. Appearance of menstruation for part of a day three weeks before death. Surface of ovaries

occupied by some old cicatrices but nearly faded, by a few pores impermeable to a bristle, but which gave exit on pressure to a little fluid, also, by some minute vesicular elevations, which, on cutting into gland, were noticed to be portions of Graafian vesicles of about the size of coriander-seed, imbedded in the peritoneal coat, with many more of which, filled with opaque fluid, and having thin delicate coats, the thickness of the peritoneal investiture, and the parenchyma of the glands, were studded, without any other appearance.

3. Mrs. L——, aged 30 years. Two children, youngest six months old.

Ovaries remarkably large, and nearly quite smooth, the vestiges of old fissures being scarcely to be perceived. Every part of interior of both glands richly studded with small but highly injected Graafian vesicles, without any trace of a cyst of any kind.

4. Mrs. R——, aged 42 years. Six children, eldest fourteen years, youngest six months. Both ovaries large, plump, fresh-looking, and without a trace of linear scars. Surface studded with minute vesicles; some in the form of dark spots only, not having yet penetrated the peritoneal covering; others protruding by a portion of their circumference through it, and others, again, burst, and exhibiting puncta still exuding fluid. A well-defined white body in each ovary, with another less marked, and numerous turgid ovisacs, were the only circumstances observable in interior of glands.

5. —— ——, aged 40. Death from dropsy six months after delivery. Ovaries large, plump, and free from the cicatrices of the menstruating period, but tender at some points as if from the recent lesion of minute vesicles, and having large segments of two white bodies projecting from the peritoneal surface, which in this situation was absorbed. Within the one ovary there were six, and in the other eight white bodies, varying from the bulk of a mustard-seed to that of a large pea, and each constituted of a dense, corrugated, internal hollow membrane, enclosed in a thin but distinct and vascular covering, and this again in a capsular condensation of the ovary.

6. Mrs. ——. Mother of ten children; youngest seven months old. Ovaries nearly smooth, but dotted with a number of open

pores, and contained internally some Graafian vesicles and about six little fatty-looking and fissured white bodies, but no other cyst.

7. Mrs. R——, aged 37 years. Six children; youngest seven months old.

One ovary.—Internal surface perfectly smooth, excepting two points of the diameter each of about a line, which were transparent vesicles, encircled at their bases by delicate opaque margins; also another point exhibiting a yellow elliptical-shaped vesicle of size of a pin-head, and a third which was a capillary-sized solution of the continuity of peritoneum. Internally were numerous small vesicles, one white body of size of a hemp-seed, and as white as snow, and several grains of rhubarb-coloured matter.

Other ovary.—Free edge vascular and tender looking, as if from recent rupture of several small vesicles; one of which remained, of a scarlet colour, and with about two-thirds of its circumference external to peritoneal coat. In the structure of the surface of the ovary was a tumid ring of size of a barley-corn, having a central depression and pore, through which a bristle could be introduced into an empty vesicle, with opaque, but otherwise unaltered coats; also, one or two rhubarb-coloured points, and several vesicles, but no white or other body.

8. Mrs. H——, aged 32 years. Had had five children; youngest, which was being suckled at mother's death, was ten months old.

One ovary.—Numerous old fissures, four or five minute transparent vesicles, and two puncta with red delicate areolæ on outer surface, and internally, four miliary sized white bodies, with the rough granular or fissured look, which depends on their state of great contraction on their cavities, and some vesicles.

Other ovary.—A yellow shining concretion of the consistence and appearance of candied sugar, and of the size of a pin-head, was imbedded in a superficial cup in the peritoneal coat; no minute vesicles, but one vascular pore was seen; and there were many pale coloured fissures, and at two points there appeared small mammillated tumors protruding from the surface. On laying these open, one was found to be a corrugated hollow body of a solid consistence and shining whiteness, enclosed in a thin capsule, and the other, which was also surrounded by a vascular covering, from which it was turned out with some adherent shreds of its substance, was likewise a corrugated corpus albidum, as large as a marrowfat-pea, and contained some yellow fluid in its white shining cavity. There were also observed two other circular white bodies with capsules.

9. Mrs. C——, aged 42. Mother of six children, youngest a year old. Ovaries smooth, with exception of two slight indentations of old standing, corresponding to which internally were white bodies of cartilaginous consistence. Circumference of ovarian parenchyma studded with small vesicles.

10. C —— F——, aged 33. Mother of six children, youngest being three years of age. Had not weaned child, or menstruated.

Right ovary.—One inch seven lines in length, and six lines at broadest part of short diameter; smooth, and of a reddish white colour; but, viewed with a strong power, some faint linear cicatrices were seen on surface, under which were two convoluted, fatty, or gristly, white bodies.

Left ovary.—One inch and three lines in length, and six lines broad. Two small vesicles beginning to present on smooth and white surface, and inner structure of both glands occupied by a number of unruptured Graafian vesicles, having their coats highly injected with blood. No traces of any other bodies.

SECTION VII.—*Ovaries in individuals who had had children, but were afterwards menstruating.*

1. Mrs. W., aged 40 years; mother of six children, all of some age. Was menstruating six days before death. Inner surface of the uterus, as far down as its cervix, beautifully injected with thickly-set blood-vessels, arranged in circular arches, or rings, connected with each other in a kind of arborescent form, and covered by a thick layer of transparent mucus, interspersed with a few small clots of blood. Fallopian tubes empty, and small-looking, without either the usual mucus or any blood. Vagina very red and vascular. Ovaries smaller than average. *Right*: No recent opening, but one lesion of surface, of about the size

of a barley-corn, which opened into an oblong cyst, of size of a small pea, having in its centre a globular portion of colourless fibrin, and its walls of a rhubarb colour. *Left* ovary generally smooth, without any new opening on surface. One capillary-sized opening, of long standing, a small unruptured Graafian vesicle projecting, denuded of peritoneum in about two-thirds of its whole superficies, from surface of gland; also, another similar vesicle, over which a portion of the peritoneum was thinned, of size of a split pea, and two linear cicatrices, were what presented externally; and internally were no more than two small Graafian vesicles observable, and three cavities, with pulpy, somewhat yellowish walls, in which, although the blood was more or less absorbed, no corrugation of their coats had happened.

2. —— ——, about 40 years; one child early in life. Menstruating recently before death; her chemise still stained. Arteries of uterus injected with carmine in turpentine, and veins with indigo. No note of state of uterine cavity retained. Ovaries very deeply and extensively fissured. On one a slit was observed in the peritoneal coat, nearly an eighth of an inch in length, permitting a hog's bristle to pass readily, by a minute circular opening, into a distended Graafian vesicle, which was found to be of an oval shape, and filled with a fresh florid coagulum of blood. The coats of this vesicle could not be separated. In the other ovary, there was a mammillated eminence, of the size of a small raisin, and of a dark colour, having a small linear division of the peritoneal coat, and a minute circular opening of the coats of the vesicle, which was found distended with a coagulum of an inky dark colour externally, but florid towards its centre. Coats of this vesicle were separated, although with difficulty, the inner being a mere pellicle, deeply dyed with the black matter of the coagulum, and the other also of very delicate structure, but much injected with vessels, some of which appeared to have been penetrated by the injection.

3. Mrs. ——, seven children; youngest three years of age. Menstruated four weeks before death. Several yellow bodies in various states; some of them exhibiting very distinctly an inner transparent pellicle, marbled with an inky pigment, penetrated by an opening from the surface, and collected into folds or

plaits, running in a serrated manner into corresponding recesses in a more external coat, which was opaque, of a yellow colour, and five or six lines thicker than the inner. In another of these, apparently of longer standing, the outer coat separated easily from the stroma, and its cavity was contracted as if from corrugation.

4. Mrs. ——, aged 46 years. Mother of six children, the youngest four years of age. Menstruated three weeks before death.

One ovary presented four considerable cicatrices, which appeared as if they had occurred in speedy succession; the older ones without vessels, the peritoneal coat being simply dyed black, while that which seemed the most recent was still surrounded by congested red vessels. This scar was about one-fourth of an inch in length, and about a line in breadth, and had behind it an elliptical cyst filled with intensely black blood. The walls of this cyst were somewhat thicker than thick post paper, of a light yellow or ochre colour, beautifully convoluted on its external aspect, and having vascular striæ dipping into its periphery from the substance of the ovary, while its inner edge presented also a serrated appearance, as if from minute and delicate duplications of the internal surface on itself. Corresponding to the other scars were two cysts, exactly similar to that described, except that the central clot had been reduced to a black line between the yellow convolutions; and in the third was a clot without any yellow envelope.

Other ovary had two scars with dark stains, the largest corresponding with a cyst of the size of a pea, the walls of which consisted of a yellow fatty matter deposited between two delicate membranes, the outer and densest presenting an exquisitely perfect brain-like aspect, and the inner, which was very delicate, being deeply stained with black blood. On removing this blood away from the inner surface, the latter exhibited something of the aspect of an unhealthy and slightly elevated ulcer, an appearance which was produced from the elevation of the internal pellicle by what looked like a soft, dirty-white, pasty matter, but which, on dividing the pellicle by slight scratches of the lancet, was found to be a layer of whitish-yellow granular matter, lying on the inner aspect of the external membrane. A black longitudinal line corresponded, internally, with the situation of the external cicatrix.

5. Mrs. M., aged 41. Mother of seven children; youngest six years of age. Menses present fourteen days before death. Arteries of uterus and ovaries injected with red size. Inner surface of uterus deeply painted with minute vessels, into which the injection had run; and at one point these were seen to shoot out at right angles from the uterine surface, like villi. The ovaries were occupied by several cerebriform cysts, two of which still communicated externally by foramina; and in one of these the yellow matter was intersected by numerous striæ of a red colour, which were persistent on pressure, as if injected vessels.

6. Mrs. M'——, aged 35. Mother of six children; youngest four years of age. Menstruated a few days before death. Arteries injected with red wax. Uterine cavity, especially at cornua, of a deep dark colour, from the presence of a lining of vascular jelly. Interior of ovaries, into which the wax injection did not penetrate, occupied by numerous 'white bodies,' of small size, some of which still contained vestiges of blood, while, externally, they looked like mere points of adipose matter; and, corresponding to a large and recent opening in the peritoneal surface of one of the ovaries, was a cyst of the size of a large boiled garden-pea, full of dark blood, but having some of its fibrin completely deprived of colouring matter. This cyst, which was of the ordinary light fawn colour, and serrated or fringed like the cephaloid bodies, was divisible into two coats, the inner surface of the exterior having the granular-coloured substance deposited on it in minute points or granules, which, when viewed in a bright light, resembled shining cellular or adipose tissue.

7. Mrs. C., aged 35 years. Mother of three children; youngest three years of age. Menses present a week before death. No opening on surface of ovaries, and no recent scar. Interior of one occupied by greatly enlarged and very vascular distended Graafian vesicles. Only two white bodies in glands.

8. Mrs. S., aged 35 years: mother of two children. Ovaries large. One marked with various smooth old cicatrices covering corpora cephaloidea and corpora lutea of various sizes, from that

of a hemp-seed to that of a pin-head, and with one ecchymosed or vascular spot, corresponding to a distended Graafian vesicle which had reached the surface.

The other ovary exhibited six or seven more recent scars, one of which was very vascular, and still patent, and led into a cyst of the bulk of a garden-pea, filled with a florid coagulum: its walls of the thickness of sheep-skin, of a bright yellow colour, beautifully convoluted, and having a strong resemblance, when viewed from within, to highly congested brain. On rubbing the interior of the cyst, even with the edge of a lancet, no lesion, cognisable with a magnifier, was produced, although it was not found possible to demonstrate an inner membrane. Externally, the cyst was easily dissected from the ovary, and displayed a thin but very vascular membrane, which, on boiling, could be separated from a more external investment.

9. ——— ———, aged 39 years. Four children; eighteen, sixteen, twelve, and six years of age. Menses present two weeks before death. Both tubes connected with ovaries by old adhesions, and one impervious, and its extremity enlarged into a sac of the size of a plum.

One ovary perforated by a hole leading into a cyst of size of a hazel-nut, its inner surface of a deep black colour, and containing a solid clot, externally of a coal black, and internally of a rose colour. In the same ovary were—1st, a discharged follicle of size of a horse-bean, without any coagulum, but having its inner membrane dyed black, and its outer yellow, and beginning to contract; 2nd, another in which this contraction was farther advanced, the inner membrane black, and the outer becoming white, cartilaginous-looking, and corrugated; 3d, three other similar bodies of smaller size from increasing contraction, yellowish externally, black internally, and coats of some thickness and puckered up into wrinkles.

The *second ovary* also contained two large membranous cysts, in one of which was a black solid coagulum, and scattered throughout the gland were four small, empty, corrugated, corpora albida, yellowish white externally, black internally, with considerable thickness and elasticity of their coats.

10. Mrs. ——— ———, aged 40. Five children; youngest five years of age.

One ovary marked by two elevated dark coloured vesicles of size each of a pea, filled with black coagula, but without any discernible external opening. The walls were of brain-looking matter, but neither an inner nor an outer membrane could be demonstrated, except in one.

Other ovary contained one white body, small, and distinctly hollow, but very attenuated in its coats.

11. Mrs. M——, aged 35. Three children; youngest five years of age. Menses present two weeks before death. No opening into either ovary, but in one, subjacent to an old cicatrix, was a cyst, in which was a partly melanotic, partly white and fibrinous clot, of about the size of a raisin, the cyst being capable of holding one a good deal larger. The inner surface of this cyst was not corrugated, but lined with a smooth, tenacious membrane, of about the thickness of writing paper; in some places dyed of a reddish yellow, and in others of a jet black. External to this was another envelope of a red tissue, but much less tenacious than the former, and beyond this was a third distinct covering of similar structure.

In the *other ovary* there were two yellow convoluted bodies, and two large cysts containing black blood, one of which, as large as a common nut, had its coagulum nearly absorbed; but its dark dyed inner surface smooth, without any diminution of size, corresponding to lessened bulk of coagulum. Walls divisible, as was supposed, into two thin membranes, the inner appearing like a cobweb when viewed by transmitted light, and not distinguishable from other when examined otherwise.

12. Widow B——, aged 38 years. Four children; youngest two years of age. Menses regular.

One ovary contained four white bodies and a cyst, the inner surface of which was covered by an ash-coloured pigment, which could easily be scraped off, leaving inner surface of vesicle, which was vascular, clean, without any distinguishable breach of its substance, unless it was that at one or two points it was, as seen by the magnifier, elevated into very minute fungiform projections.

The *other ovary* was gathered at one part into a mammillated tumor, having the peritoneum much injected with minute florid vessels, under which an enlarged Graafian vesicle was found, and the gland was occupied also by four white bodies and one bright yellow cyst; on rubbing the inner surface of which a semifluid pasty substance, giving colour to the cyst, could be detached, exposing the inner highly vascular surface of the cyst, stained in several places with the yellow matter, but covered over with numerous minute, slightly raised, and florid granulations, or projecting blood-vessels.

SECTION VIII.—*Ovaries in women who had had children, and in whom menstruation, re-established, had been arrested by disease.*

1. Mrs. B——, aged 30 years. One child. Death from phthisis.

Surface of *ovaries* occupied by transparent miliary-sized vesicles, some of which were protruded from the peritoneal coat to nearly their whole extent. Interior of each ovary contained several white bodies, and one of them a vesicle filled with a melanotic coagulum, which although, judging from the minute size of the cicatrix of what had been its external opening, of considerable standing, had undergone little absorption.

2. Mrs. M——, aged 43. Had one child, and several abortions. Delicate health and amenorrhœa for two years. Both ovaries of good size, with several faint scars, interspersed with small vascular elevations of the peritoneal surface. Internal structure a vascular pulp, oozing out fluid from numerous capillary-sized points, and sprinkled with vesicles, visible only with a magnifier, and having extremely delicate coats. No white, yellow, or other body visible.

3. —— ——, said to be aged 50 years, but asserting that she had menstruated four months before death, which arose from dropsy.

One ovary had traces of several old scars, and various spots of a scarlet and one of a purple colour, on its surface, the latter corresponding internally with a vesicle filled with fluid blood: ovary contained several well-marked hollow white bodies, and some very small-sized yellow ones, but no unbroken vesicle was observable by naked eye.

Other ovary had some similar scars and purple spots on surface, and internally several corpora lutea, or vesicles with thin coats dyed yellow, and their inner surface still smeared with blood. No unbroken vesicles.

4. —— Hill, aged 25. A prostitute, who was said to have had several abortions. Uterus small and thin, its cavity obliterated, except at one cornu. Orifice large and patent. Ovaries enveloped in broad ligaments and adventitious membrane, on the surface of which were various cysts, having a resemblance to extruded Graafian vesicles. Interior of glands contained no yellow or cephaloid, but a number of white bodies, some unbroken vesicles, and a few bloody cysts, in one of which the coagulum was as large as a pea, very soft, of a snuff brown colour; and the coat of the vesicle were deeply stained, but without any thickening or deposit.

SECTION IX.—*Ovaries in individuals who had had children, and had ceased to menstruate from age.*

1. —— ——, aged 50 years. Mother of four children. Uterus healthy.

One ovary size of a dried horse-bean, much corrugated, with inner structure solid, dry, and containing two cream-white bodies, but no vesicles.

Other ovary as large as a kidney bean, and containing an inky-coloured empty vesicle (corpus nigrum). One white body, but no unbroken vesicles.

2. Widow C——, aged about 54. Mother of a large family.

Left ovary indented with numerous fissures, and one unbroken Graafian vesicle, with vascular coats. Internally there was a cyst of size of a dried pea, of a very deep yellow colour, and having a dark-coloured pellicular lining, as if of inner membrane slightly dyed black; also two very distinct hollow and very white bodies.

Right ovary similarly indented with the left, and at one point particularly, where the peritoneal coat was still of a black colour, the depression was found to cover a cerebriform cyst of a linear shape, traversed by a melanotic line, and coated with an inner membrane. Ovary also contained four white bodies, but no unchanged vesicles.

3. Mrs. S——, aged 58. One child about twenty years of age. Ovaries much denticulated by fissures, and on surface of right ovary was a vesicle of size of a pea, filled with a transparent yellow fluid. Internally were two corpora nigra, and some white, but no cephaloid, or yellow bodies, or vesicles.

3*a*. —— ——, a woman, upwards of sixty years of age, who had had a numerous family. Vagina large and smooth. Os uteri wide, more than an inch in length, its edges hard and denticulated, but without ulceration. A small flattened polypus hung from the situation of the Nabothian follicles. Tubes impervious at uterine extremities. Ovaries strongly fissured, and of the shape and nearly the size seen in children, and having a delicate vesicle, of the bulk of a pin-head, extruded from the surface of the one, and a minute copper-coloured punctum in the other. Interior of each consisted of a succulent pulp, which communicated to the finger the impression of being formed of numerous very minute grains, and, when examined with a magnifier, some of these were ascertained to be vesicular, although of the most fragile structure, and to be the source, along, as was supposed, with a multitude which could not be so demonstrated, of a copious oozing of fluid which issued from the cut surfaces of the glands. There were also two well-formed and vascular, but delicate, Graafian vesicles, of the size each of a millet-seed, observed in the sessile edge of one of the ovaries.

4. Mrs. S——, aged 64. Mother of four children; youngest twenty-four years of age. A very healthy woman, who died of fever. Ovaries much atrophied, and consisting almost wholly of peritoneum, imbedded in which were four hollow white bodies, one as large as a pea. On the surface of the ovaries, and in the broad ligaments adjacent, were numerous vesicles of different sizes; those nearest ovaries arranged in clusters; some of the size of millet-seeds, and transparent; others larger and opaque; and some of those which were furthest removed from the ovaries, were solid, and consisted of a stony matter, which, on cutting the membranous capsular investment, was easily enucleated.

5. —— ——, aged 75. Os uteri enlarged and fissured, as if it had been once gravid. Ovaries attenuated, but contained the one six or eight, and the other nine, small-sized corpora

albida, and a very succulent and vascular pulp, oozing out fluid profusely, and having an indistinct appearance with a common magnifier of containing numerous small sized and very fragile vesicles. Fallopian tubes were impervious near to the uterus. The surface of one ovary was studded with numerous eyes, or very minute but distinct vesicles, like ovisacs, some of which had given way, and left patent pores, precisely as in the other non-menstruating periods of life. There were two or three large vesicles in the broad ligament, from which slender pedicles could be traced connecting them with the ovary.

6. Preparation of Dr. Paterson's, Anderson's Institution. Uterus and appendages of a woman age 103 years, and the mother of several children.

One ovary reduced to size of a boiled garden-pea, and the other smaller; one of them having one or two triangular, and the other several very distinct punctuated cicatrices on surface. Internal structure of glands a homogeneous pulp, but gathered into a solid tissue at apices, and with some indistinct indication of a vesicle.

Air was made to pass with difficulty along one tube from the uterus to the pavilion; but on some subsequent attempts this could not be repeated, and in the other tube failed altogether, the obstruction in both being at the uterine extremity of the tube, near to its termination.

SUMMARY.

1. The Fallopian tubes of the infant, and of the child before puberty, are perfect in their structure, although their patency is more or less obstructed at birth by the presence in them and in the uterus of a tenacious glue-coloured mucus; and immediately before the establishment of menstruation, and throughout adult life, they are occupied, and have their uterine extremities in particular distended by a cream-looking fluid similar in appearance to the ordinary vaginal secretion, and which, as observed by the microscope, consists of innumerable very minute globules aggregated into masses usually of an oval form, and

possessing a specific character different from the globules either of blood or of pus. Part I., Sect. I., 1, 2, 3, 4, 5; Sect. II., 5; Part II., Sect. I., 1.

2. The ovaries of new-born infants and children are occupied, sometimes numerously, by Graafian vesicles or ovisacs, which are highly vascular as early as the sixth year, and vary in size from the bulk of a coriander-seed to that of a small raisin, in the fourteenth year, at which time, also, they are filled with their usual transparent granular fluid; their contained ova can be detected, and their coats are so elastic that their contents, on their rupture, may be projected to at least twelve inches: the existence of menstruation not being essential, therefore to these conditions, either as a cause of them or as an effect, and the possibility, even at this age, should rupture of the follicles occur, of their contained ova being conveyed to the uterus along the Fallopian tubes, kept patent by their peculiar secretion, will be admitted. Part I., Sect. I. 1, 2, 3, 4, 5, 6, 7, 8, 9.

3. The Graafian vesicles contained in the ovaries prior to menstruation are found, as they also are in every other period of life, in continual progression towards the circumference of the glands, which they penetrate, discharging themselves by circular-shaped capillary-sized pores or openings in the peritoneal coat (Part I., Sect. I., 2, 3, 4, 5, 6, 7, 10); the presence of the catamenia being thus no indispensable prerequisite to their rupture.

4. The establishment of menstruation does not necessarily give rise to any immediate modification in the manner in which the ovisacs are discharged, or in the subsequent changes which these bodies undergo; but in some cases the conditions which obtain in the period before puberty are extended for a time, into that of menstruation. P. I., S. II., 1, 2.

5. The ovisacs of the healthy menstruating female are, as a general rule, larger, and more injected with red vessels, than they are previous to the setting up of that condition; but such change may have interposed a transition state in which the appearances peculiar to both, or the small-sized vesicles of the interior of the ovaries, the miliary copper-coloured macules, the numerous but delicate vesicular elevations and punctiform openings of the surface, of the infantile period, and the pisi-

form, turgid vesicles, the organised cysts, and the angular or linear cicatrices of the menstruating, are intermixed. P. I., S. II., 3.

6. Menstruation gives rise to a congested state of the uterine vessels, manifested by a redness and increased vascularity of the vagina, and by the production on the internal surface of the cavity of the uterus of a mesh-work of deciduous villous vessels, which may remain for at least two weeks. P. I., S. II., 1, 2, 3, 4, 5; P. II., S. VII. passim.

7. The progression of the Graafian follicles, or ovisacs, towards the surface of the ovaries, their appearance under the peritoneal coat as copper-coloured macules, the absorption of that membrane, and of their own tunics, and the occurrence of a solution of their continuity at the point at which they unite, take place in the menstrual, precisely as in the ante-menstrual life; but in the former the vesicles are increased in bulk, vascularity, and organisation, so that in their rupture there is generally a greater lesion of the peritoneum, and, after the escape of the ovulum and granular fluid, a larger effusion of blood into the vesicular cavity, and more remarkable subsequent changes in the coats of the ruptured cysts than in the non-menstrual state. P. I., S. II.; P. II., S. VII.

8. The shape assumed by the ovisacs is circular, elliptical, or triangular, according very much as they occupy the body of the ovary, its margins, or the central point of its free edge; and the cicatrices left by their discharge are often irregularly linear or circular, according to the same circumstances—passim.

9. The ovisacs of the human female do not require the establishment or presence of menstruation for their development or rupture. Vesicles of adult size may exist and be discharged about the age of puberty, as also at other periods of life, independently of menstruation; and this state may be present in its normal form for at least eight consecutive periods, without a vesicle being ruptured, unless after the manner, and with the phenomena, which occur in childhood. P. I., S. I. 6, 7, 8, 9; S. II., 1, 2; S. III. IV. V.; P. II. passim.

10. The only circumstances essential to the discharge of ova are the rise of the vesicles which contain them to the surface, and the gradual thinning of the ovarian peritoneum, and of the

coats of the ovisacs at their point of union; and although, from the augmented circulation of blood in the uterus at the menstrual period, it is possible that the rupture of vesicles which are thus prepared may happen more frequently at that than at any other time, there is yet no reason to suppose that it does so then exclusively, or that it may not take place during the intervals, menstruation being often present without any such rupture. P. I., S. II., 7, 8; S. III., 1, 2; S. IV., 1, 2, 4; S. V., 1, 2; P. II., S. III., 1, 4; S. V., 4, 5; S. VI., 4, 7, 8; S. VIII., 1, 7, 11; S. VIII., 1, 5.

11. The appearances presented by the ovaries, Graafian vesicles, and by the blood which is contained in the latter subsequent to their rupture, vary according to the time at which they are examined, and the absorbing power of the individual.

12. In cases of the recent evacuation of an ovisac the peritoneal coat of the ovary is occupied by a jagged slit or opening, having a florid vascular areola; in those of longer standing the opening is covered over, with the exception of a minute circular foramen in the centre, or, where the slit has been of great length, of two such openings, with new tissue, surrounded by a claret-coloured margin; and in those still more ancient, the whole is healed up into a cicatrice, which is more or less superficial, and free from discoloration according to its age.

13. With respect to the blood which is generally contained in the ruptured vesicles, it is seen at first as a florid coagulum, next having its centre only scarlet-coloured, and its periphery more or less black, and perhaps furrowed; frequently the clot has a gamboge colour, from the decomposition, or has become pale from the absorption of its red globules; and lastly, the clot is found in different stages of absorption; but it sometimes also happens, and that indifferently in every variety of the uterine state, that the ruptured follicles are found empty, or containing only an aqueous fluid.

14. The coats of the ruptured ovisacs have been found in four different general conditions, apparently dependent on the relative degree of organisation, and each class presenting, also, modifications of their respective characteristics, proceeding partly from the same cause, and partly, also, from changes connected with the period of their progress in which they were examined.

15. The first class was distinguished by the attenuated state of the coats of the ruptured ovisac, and by the total absence of any organic changes in these different from their condition previous to their discharge; the only alterations observable being—

A. The mechanical dying of their coats of an inky black colour proceeding from their contact with their contained decomposed blood, and which bodies have in the descriptions been denominated corpora nigra. P. I., S. II., 1, 7; S. IV., 4; S. V., 2; P. II., S. I., 1, 4; S. II., 3; S. III., 4; S. IV., 1, 3; S. V., 3, 5; S. VII., 2; S. VIII., 1, 5; S. IX., 1, 3.

B. The dying of their coats of a yellow tint, from their enclosed clot of blood having become converted into a rust-coloured pigment, not unlike some of the denser sputa of acute pneumonia. These I have taken the liberty of calling, in the grammatical sense, corpora lutea, omitting at the same time the use of this term in its ordinary scientific meaning. P. I., S. II., 9, 10; S. IV., 5, 6; P. II., S. V., 1, 3; S. VII., 1; S. VIII., 4.

This first class of ruptured ovisacs was found indifferently in all ages and states subsequently to puberty.

16. The second general class of ruptured vesicles was characterised, in addition to the presence of blood within their cavities, or, sometimes, when this had been either partially or entirely absorbed, of a black or of a yellowish stain, by organic changes in their coats, consisting, progressively, of an increased vascularity, a thickening, a whitening of the colour, and, finally, a corrugation of their tissue, and was observed—

A. Under the form of soft white bodies of a yellowish, fatty aspect, having the outer coat much thickened, while their inner remained as a delicate diaphanous pellicle. P. I., S. II., 10; S. IV., 1, 3, 5; S. V., 2, 4; P. II., S. IV., 3; S. IX., 2.

B. As dense white bodies of a whitish, shining, firm structure, their inner coat being the seat of these changes, and their outer adhering loosely as a transparent, pellicular layer. P. I., S. IV., 3, 6; P. II., S. III., 4; S. IV., 1; S. V., 4; S. VI., 7, 8, 9; S. IX., 1, 4.

A. The discharged ovisacs which constituted the soft white bodies were seen—

1st. At a very early period after their discharge, their walls distended with a coagulum, and painted with turgid vessels, but not being divisible into layers. P. I., S. II., 4, et passim.

2nd. In a similar state, except that the inner membrane had a swollen, puffy look, and from the looseness of its adhesions to to the more external layer, could be easily gathered into folds. P. II., S. VII., 2, et passim.

3rd. At a period so advanced that the clot had become uniformly black and solid, the inner layer was easily separated from the more external, which was also thickened and become of a yellowish colour, having a resemblance to the walls of an artery. P. I., S. II., 5, et passim.

4th. At a point still more advanced, the outer, thickened yellowish coat, had become corrugated into wrinkles or folds projecting into the cavity and covered by the soft inner layer, sometimes dyed yellow or black, as at 15 A. B. P. II., S. VII., 3.

5th. At what appeared to be yet a more lengthened period, the cysts were converted into yellowish-white, and generally globular bodies, more or less fissured from their contraction, and sometimes in process of absorption, having a granular looking structure, and seldom being divisible into laminæ by simple dissection. P. I., S. V., 2, 4; P. II., S. VII., 9.

B. The dense white bodies were seen—

1st. With inner layer still vascular, but thickened. P. II., S. VII., 12.

2nd. With vessels of inner coat nearly obliterated, and the coat itself converted into a tenacious membrane of the thickness of writing paper. P. II., S. VII., 11, or S. V., 4.

3rd. With inner layer of ovisac as a thick, opaque, deeply wrinkled or corrugated, and rocky cyst, or, sometimes, partially diaphanous, and of a shining pearly aspect, and very white colour, most generally empty, but sometimes containing a yellow or greenish transparent fluid, or a clot of blood, either unchanged or converted into a yellow or black pigment (as at 15 A. B.), the outer layer of the sac being a mere film or pellicle. P I., S. IV., 6.

17. These white bodies (corpora albida) were found in every variety of uterine condition subsequent to the establishment of

menstruation, but never before it, and the dense kind especially were persistent for a long period.

18. White bodies, as such, had no necessary connection with the gravid condition, but occasionally they were, especially the dense variety (the corpora lutea of Bäer), the only specialty observable in the ovaries of the puerperal female some time after delivery.

19. The third general class of discharged ovisacs was distinguished by the secretion of an organised, yellow-coloured, brain-like, granular matter, and differed—

A. As the cerebriform matter was connected with ruptured ovisacs of (15) the first class, having transparent, pellicular coats, or with those of (16) the second class, having either their outer or inner coat thickened.

B. According as the granular substance was deposited external to the inner layer only, or to the two internal layers of the ovisac.

A. In menstruating females, and also during the first months of the gravid state, and sometimes even in the period of lactation, the ovaries were found occupied by one or more, and at times by five or six yellow bodies or cysts, the structure of which, especially in the more perfectly organised specimens, presented a striking resemblance to the convoluted reddish-yellow surface of the brain, covered by its inner membranes, and painted with its scarlet coloured and dark vessels, and which, in the cases which admitted of it, had some resemblance, when it was examined by transmitted light, to the appearance presented by granules of adipose tissue. The coverings of the cysts were often, in delicate or in unhealthy females, or when their absorption was advanced, so attenuated as not to admit of demonstration (P. II., S. VII., 10), but in general they possessed the structure and appearance of the coats of the ovisac as these exist previous to the rupture, and in other instances they had undergone various degrees of that process of thickening by which the maturated and discharged Graafian vesicles or ovisacs are transformed into white bodies.

In the cysts with thin transparent membranes, the inner surface was, with some exceptions, where a membrane could not be detected (P. II., S. VII., 8), found lined by a delicate pellicle, which was often stained with blood, through which the yellow matter was visible (P. II., S. I., 1) as a dirty, cream-coloured pulp, or a paste of moistened white lead, which had been soiled, but at other times, when the blood was absorbed, the inner, and, in all cases, the outer surface of the cyst, exhibited the ordinary distinctive cerebriform character; and on scratching either aspect with a lancet, the granular matter was exposed situated between the two membranes. P. II., S. VII., 4, 6.

In those instances, again, in which the outer membrane had ceased to be transparent, the cysts, when insulated, displayed a cartilaginous looking exterior, having the yellow matter arranged on its internal surface covered by the inner membrane still diaphanous, although better organised than in those already described. P. I., S. IV., 1, 5; P. II., passim.

In proportion to the age of these cephaloid bodies, and perhaps also to the absorbing power of the female, they were found undergoing different degrees of diminution. In those possessed only of thin coats, or having the outer layer as the seat of thickening, the walls of the cysts speedily contracted and coalesced, while their centres exhibited, in the less organised, a delicate opaque streak; and in those better developed a serrated, curved, well-marked white line (P. I., S. II., 8, 10; S. IV., 1; P. II., S. I., 2, 6, 7), or a stellated point (P. I., S. IV., 1), according as the cyst was of an elliptical or of a globular form.

This variety of cerebriform cyst, in which the walls were pellicular in their structure, or the outer coat only thickened, the granular matter being deposited in either case between the layers, was met with in a recent state indifferently in immediate connection with the existence of menstruation and of the first seven months of pregnancy, and in this latter case, and also in a conversion of this form yet to be (20) described, they constituted the corpora lutea of Dr. Montgomery. P. I., S. II., 3, 6, 8, 10; S. III., 3; S. IV., 1, 5; P. II., S. I., 1, 2, 3, 5, *5a*, 6, 7; S. II., 3; S. IV., 7; S. VII., 4.

B. In another variety of this granular deposition, the new tissue was found external to the two innermost layers of the Graafian vesicle, these latter being, in such case uniformly, converted into a dense white body (16 B) surrounded by an envelope of yellow matter (P. II., S. I., 4, 5, 6*a*, 8, 10, 11*a*, S. II. 2). Such cysts (corpora lutea of Dr. Lee) were never observed as an effect of menstruation simply, but were met with exclusively in the gravid female; although they were seen, as was sometimes also (P. II., S. I., 2, 7) the cephaloid body with soft coats (19 A) just described, presenting double in some cases of single conception (P. II., S. I., 9; S. II., 4).

This form (19 B) of corpora cephaloidea was generally distinguished by large, persistent, white, glistening cavities, and, when divided, by cerebriform striated rings, the matter of which latter was found nearly absorbed three days after parturition (P. II., S. II., 2), and had disappeared entirely in another case (P. II., S. II., 4) three weeks after delivery at the natural term, the parchment-looking inner layer, with its delicate, transparent envelope, being left in the form simply of a dense white body. A modification of these characteristics occurred when the usual cellular connections uniting the elastic internal coat of the ruptured vesicle with the more external had given way, and permitted the former to become rolled up as an almost solid pellet within the granular matter still lined by the latter (P. I., S. I., 4, 5, 8, 11*b*; S. II., 5); and another modification was when the granular matter, instead of suffering absorption, became more vascular, and converted into (20) a red body (P. II., S. II., 5), precisely as in the former case (19 A).

20. The fourth general state of the ruptured ovisac was peculiar to the impregnated and lactating female in the period between the eighth and thirteenth month after conception, and appeared to be a conversion of the forms (16 A. B. and 19 A. B.) already described, arising out of a higher and more perfect organisation. The condition was not observed till subsequent to the seventh month of utero-gestation, or later than the sixteenth week after delivery, and in some instances as early as two (P. II., S. II., 2), three (S. II., 4), five (S. III., 1), ten (S. IV., 1), and twelve weeks (S. IV., 2), after parturition at the natural term, it was also absent.

Down to the seventh month of pregnancy, the cysts contained in the ovaries (P. II., S. I., 1, 2, 3, 4, 5, 6, and 7) did not differ in any respect from the cerebriform bodies found in the unimpregnated state, unless that they were sometimes plumper, more vascular, better developed, and had their inner layer more frequently thickened. At the ninth month, the yellow granular matter had lost the rhubarb colour which it before this occasionally presented (P. II., S. I., 5), had become more dense, and of a pale, slightly yellowish hue or fawn-colour (P. II., S. I., 9), changing to a faint red (P. II., S. I., 8, 10) on the access of air. Its structure was now about an eighth of an inch in thickness, and appeared as if formed of extremely delicate fibrils, which lay obliquely across, alterations supposed to depend not only on vital causes, but also on the contraction of the cyst, the cavity of which, having its inner surface covered (except in those instances (P. II., S. II., 5; S.V., 2, 4), in which the inner layer was the part thickened), by the pellicular internal membrane, was now reduced either to a curved groove or to a circular stellated point, according to the shape of the cyst; a configuration produced by the corrugation on the plastic cobweb structure of the inner membrane of the highly organised and elastic outer layer and cerebriform matter.

At the end of the first month after delivery (tenth month), the external ring was (P. II., S. II. passim) of a mottled yellowish red, and sometimes of a decided rose colour, and became very florid on exposure to the air, its section having some likeness, in the oblique arrangement of its seeming fibres, to that of the left ventricle of the heart. In one case, at the end of the second month after parturition (eleventh month), this ring (P. II., S. III. passim) is described as being of a brownish red colour, and as resembling the horny and glistening tissue of the condensed cuticle around some kinds of clavi when newly pared; and in another instance, in which the second month was completed, it appeared as a horny, grey-coloured, semi-transparent substance, having a striking resemblance, in its linear arrangement and fleshy colour, to the human nail in the living subject, as it rests on the subjacent pulp; its colour when examined by transmitted light appearing to depend on the presence of red vessels, which in a case at the fourth month (thirteenth month), were seen proceeding (P. II., S. V., 1.) from a capsular investment.

In three instances of ovaries belonging to gravid women which were observed, there were important modifications from those described in the structure of the red bodies. In one case (S. II., 5) while the redness was still situated in the outer layer of the Graafian vesicle, the inner layer, instead of being a mere pellicle, as was usually the fact, was thickened, and opaque, as in the cerebriform bodies (19 B) already spoken of as having been seen only in the puerperal state; and in two others again (S. V., 2, 4), both the redness and thickening were situated in the inner layer, the cysts being obviously undergoing conversion into the condition of dense white bodies (16 B), just as often happens in the virgin. In one of the latter, also (S. V., 2), the inner aspect of its vascular surface was covered with a yellow pigment of what seemed to be (corpora lutea 15 B) disorganised blood.

21. The rose or red coloured (corpora rubra) fibrous bodies (20) now described, although, in their most usual form as consisting of an external very vascular portion, enclosing an opaque film, they were found exclusively in puerperal females, were yet not always present in the gravid or recently puerperal states.

Up to the seventh month of gestation cerebriform bodies only were seen, and in one case (P. II., S. III., 3) the same thing was observed eight weeks after delivery; while in another individual (P. II., S. II., 2) dying two weeks, and in a third (P. II., S. II., 4), three weeks, and in a fourth (P. II., S. III., 1), five weeks after parturition, neither rose-coloured nor cerebriform bodies were present, the only ovarian cysts detected being the two varieties of white bodies (16 A, B), a state of matters which was renewedly observed at the eighth (P. II., S. III., 4), tenth (S. IV., 1), twelfth (S. IV., 2), and sixteenth weeks (V., 3), and also at various (VI., 3, 4, 5, 6, 7, 8) more advanced periods after the birth of the child.

22. This excess of corpora albida over every other physiological appearance in the impregnated ovary, seemed to result sometimes (P. II., S. V., 3), from a gradual obliteration of the vessels of the highly vascular outer coat and cerebriform matter lining it, which had constituted in succession a cerebriform body with transparent membranes (19 A), and afterwards, a corpus

rubrum (20) with single cobweb-like lining, and ultimately, a soft (16 A), white body; and, again, to be produced at other times (P. II., S. II., 2) by the absorption of the cerebriform matter which had been previously arranged external (19 B) to the thickened inner and pellicular more external layer of the cyst; while in another description of cases (P. II., S. II., 4; III., 1; V. 2, 4) the total absence of granular deposit was noticed in such circumstances as to give much countenance to the supposition that in some instances of conception this phenomenon may not take place at all; but that, as sometimes occurs in the unimpregnated female, an increased vascularity and organisation of the outer or of the inner layer of the ruptured vesicle is succeeded at once, without any such intermediate stage as involves (19 A, B) the deposition of brain-like matter, by the formation respectively of a soft, or of a dense white body, as at 16 A, B.

23. In many puerperal women bodies of identical character, but in different stages of progression, were often found together, and it was then supposed that the best organised cysts were at once the most recent, and those which had furnished the fecundated ova; and that the others had been in existence for too long, although not necessarily a very long time, before the occurrence of conception, to permit them to take on any increase of development consequent on gravidity (P. II.: S. I., 3, III. 4; IV. 1, 2; V. 2, 4, 5; VI. 1, 4, 5, 6, 7, 8, 9, 10).

24. In other pregnant women, in none of which had there been twins born, and in one of which the fact of there being a single conception only, was capable of being demonstrated (P. II., S. II., 4), two bodies of a similar kind, and of equal organisation, were found either in the same ovary, or in the two; and in such it was impossible to determine the productive from the non-productive vesicle, and their rupture, therefore, was believed to have been coetaneous, and that while the ovum of the one only had been fecundated, the coats of both, alike capable of taking on a higher organisation, had been exposed equally to the increased ovarian circulation consequent on utero-gestation (P. II., S. I., 6, 7, 8; S., II., 4).

25. The simultaneous development in the ovaries of two corpora rubra (20) was not met with in the present series of

observations—a circumstance which may be attributed, however, to the comparatively limited nature of the latter, the general results of which, in respect to the ovaries of recently impregnated females, may be thus stated : —

Appearance in Ovaries of	Coincident with a period after conception of
a. *One* cerebriform body, with *single* cobweb-like lining (19 A). (Corpus luteum of Dr. Montgomery.)	A few weeks, Part II., Sect. I. 1. About four months, Sect. I. 3. About four months, Sect. I. 5 *a.* Four months, Sect. I. 6.
b. *Two* cerebriform bodies, with *single* cobweb-like lining (19 A); ovum of one only having been fecundated.	About six weeks, Sect. I. 2. Seven months, Sect. I. 7.
c. *One* cerebriform body, with *double* lining, innermost hard and opaque, with *persistent* cavity (19 B). (Corpus luteum of Dr. R. Lee.)	Three months, Sect. I. 4, 5. Four months, Sect. I. 6 *a.* Eight months, Sect. I. 10. Nine months, Sect. I. 11 *a.* Nine months, Sect. II. 2.
d. *Two* cerebriform bodies, *one* with *double* lining, as at *c*; the other *single*, as at *a*; and only one conception.	Seven months, Sect. I. 8.
e. *Two* cerebriform bodies, *both* having the granular matter *exterior* to the *membranes*, as at *c* (19 B); ovum of one only impregnated.	Nine months, Part II., Sect. I. 9.
f. *Cerebriform* bodies of *both* kinds (19 A, B) in a *transition* state to *red bodies* (20); and, in common with all the varieties of corpora rubra, seen only in the puerperal female.	Nine months, Sect. I. 9, 10, 11; Sect. II. 1.
g. *One* red body (20), with *single* cobweb-like lining apparently a *conversion* of 19 A.	Ten months, Sect. II. 3. Eleven months, Sect. III. 2, 3, 5. Twelve months, Sect. IV. 3. Thirteen months, Sect. V. 1, 3.
h. *One* red body (20), with thick opaque lining, apparently a *conversion* of 19 B. Redness in *outer* layer.	Ten months, Sect. II. 5.
i. *Red* bodies; the redness situated in the *inner* layer (19 B), and apparently in a transition state to white bodies (16 B).	Thirteen months, Sect. V. 2, 4.
j. *One soft white* body (16 A). (Corpus luteum of some writers.)	Ten months, Sect. III. 1.
k. *Two* or *more* soft white bodies (16 A); one conception only.	Twelve to thirty-six months, Sect. IV. 1, 2; V. 5; VI. 4, 5, 6, 7, 8, 9, 10.
l. *One hard* white body (16 B). (Corpus luteum of Von Baer.)	Eleven months, Sect. III. 4. Fourteen months, Sect. VI. 1.
m. *Two* or *more* dense white bodies (16 B), some of them probably conversions of cerebriform bodies (19 B), from absorption of external granular matter.	Tenth month, Sect. II. 4. Thirteenth month, Sect. V. 4.
n. Unruptured ovisacs *only*.	Fifteen months, Sect. VI. 2, 3.

26. There was no evidence furnished by any part of the investigation that granular matter was ever secreted around an unruptured Graafian folicle. A few of the cephaloid bodies in the pregnant female, instead of containing a coagulum, or being either empty or having their walls agglutinated together, were distended by the exudation from their inner surfaces of a transparent fluid, of a reddish, of a green, or of a yellow colour, the minute foramina by which they had been originally emptied of their ova and granular fluid having become obstructed, either by the contraction on them of the pulpy structure of one variety (19 A), or by the elasticity of the other (19 B), and an appearance produced which, unless for the discovery of the capillary-sized openings by which they had been perforated, might have been mistaken for Graafian vesicles still undischarged, and having a deposit of granular matter covering their coats. (P. II., S. I., 4, 5; S. II., 2; S. VI., 8).

27. A nippled or cumulated protuberance of the surface of the ovaries over a granular cyst; crateriform openings on the apices of the latter, with vascular edges; and serrated 'internal cicatrices,' as they have been termed, traversing the interior of the cephaloid bodies; and blood-vessels ramifying on their granular matter, were not peculiar, as has been asserted, to the gravid female. (P. I., S. II.; P. II., S. VII. passim).

28. Immediately on the arrest, and during the suspension, of menstruation, by pregnancy, lactation, disease, or old age, the Graafian vesicles were found less vascular, of greater tenuity, and of smaller size, than their normal structure in menstrual life, and to rise to the circumference of the glands, and to be eliminated by very superficial and capillary-sized punctulated lesions of the surface of the ovary, precisely as, during infancy and childhood, the linear or angular cicatrices of menstruation, becoming at the same time gradually filled up or erased. (P. I., S. III. IV. V.; P. II., S. I. II. III. IV. V. VI. VIII. passim, S. IX., 4).

29. The coexistence of this modification of the ovisacs with the presence of cerebriform or of white bodies in the ovaries, was not peculiar to the gravid state, and could not, therefore, be relied on, unconditionally, as a proof of pregnancy (P. I., S. III., 2, 3; IV., 1, 3; V., 2); but its weight, as evidence of

the earlier months of that condition, might be esteemed considerable when the corpora cephaloidea were large, massive, highly organised, and associated with similar bodies of a less perfect kind and smaller size, linear cicatrices, and other marks in the ovaries of recent menstruation, and, also, with the existence in the uterus of a deep mahogany-coloured stain, from the late adherence of the ovum (P. II., S. I., 4, 5, 6, 7). And the same estimate of its value, as a proof of a not far distant parturition at the full term, was warrantable when the corpora albida were perfect; the mammæ, abdomen, and thighs, indented with lineæ albicantes; the uterus bulky, discoloured, and flaccid, its labia fissured, and the spermatic or hypogastric veins occupied by coagula. (P. II., S. II., 2, 4; S. III., 1, 4; S. V., 4, 5; S. VI., 4, 7).

30. The obliteration of the cicatrices peculiar to menstruation, the presence of miliary ovisacs in the ovaries, and their appearance beneath the peritoneal coat as small copper-coloured spots, along with others of a yet more minute size, which had penetrated the substance of this membrane, and which did not require more than its thickness for their entire inclusion, together with the protrusion of some of these, often with extremely attenuated coats, in the form of very minute vesicles at the surface of the ovary, or along with puncta, or with a raw, blistered, or abraded appearance, occasioned by their recent rupture; and the existence at the same time, in either ovary, of a cerebriform body (19 B), having the granular matter exterior to the two inner layers of the ovisac, or of a mottled, yellowish red, or of a roseate coloured or red fibrous body (20), was a combination of circumstances which was met with exclusively during pregnancy, or within four months after delivery at the natural term. (P. II., S. I., 10; S. II., 1, 3, 5; S. III., 2; S. V., 1, 3).

31. The changes in the character and mode of the production and discharge of the Graafian vesicles which follow suppressed menstruation, from whatever cause the latter proceeds, was not seen to occur earlier (P. I., S. II., 8; P. II., S. I., 5) than two months after the last menstrual flow; and previous to the expiry of this period, therefore, there were, in such cases at least as presented only the cephaloid bodies (19 A), no in-

dications by which the fact of pregnancy could be determined (P. II., S. I., 1, 2) irrespective of the discovery of the ovum, and the greater organisation of the deciduous fungiform villosities which are thrown out in the uterine cavity at every menstruation, and which, in such cases, suggest the idea of their being the rudimentary spiral arterial coils and horizontal sinuses of the membranous decidua.

32. In some cases of newly-established menstruation (P. I., S. II., 3), and also of amenorrhœa of short standing (P. I., S. IV., 1), an aggregate of phenomena was met with similar to that seen in the earlier months of gravidity, consisting of a diminution of the size of the ovarian follicles, the presence of well-developed cephaloid bodies, the remains of linear cicatrices, and a smooth appearance of the ovaries, which were studded, also, with copper-coloured macules, minute vesicles, and porous openings, and found united, in the lately menstruating female, to a vascular, congested, and ecchymosed state of the internal surface of the uterus; and in such cases, also, it is impossible to distinguish the state from that of those examples of early pregnancy (P. II., S. I., 2, 3, 5*a*, 6, 7), in which the corpora cephaloidea are of the construction (19 A) met with in the virgin ovary, except by a reference to the history of the individual, and the size and other conditions of the uterus.

33. While the compatibility of pregnancy with the presence in the ovaries of cephaloid bodies, having a delicate inner layer similar to that seen in the same bodies in the unimpregnated female, is undoubted (compare P. I., S. II.; P. II., S. VII. with P. II., S. I.); the inner layer of ruptured ovisacs was sometimes found either (P. II., S. VII., 11, 12) in process of thickening, or (P. I., S. IV., 3, 6) already converted into a hard cyst, in circumstances where the appearance had no connection with pregnancy; but on these occasions the hypertrophy of the inner layer was not accompanied by any deposition around it of granular or cerebriform matter; and in no instance was the union of hypertrophy of the inner coat of the discharged follicle, and the formation on it of cephaloid tissue, met with, whether the former was gathered up (P. II., S. I., 4, 5, 8, 11*b*) within the latter, as an insulated pellet or a thickened vesicle, or was extended out on it (P. II., S. I., 6*a*, 9, 10, 11*a*) as an open

cavity, unless during utero-gestation, and that also frequently in its earlier months; while the latter months of the same condition, and a period of four months after natural parturition, although obtaining sometimes without such appearance, were uniformly indicated when a corpus rubrum was present (P. II., S. I., II., III., IV., V. passim), the red body so found being always a conversion of one or other of the varieties of corpora cephaloidea (19 A and B).

34. The only special indication which distinguished the ovaries of lactating women delivered at longer periods than four months after the natural term, was the unusual prevalence in them, coexistently with the general characteristics already noted, of corpora albida—a circumstance dependent, probably, as is also the diminished size and organisation of the unruptured vesicles in the same cases, on the lowered vascular activity of the uterine system during lactation. Compare P. I., S. II., and P. II., S. VII., with P. II., S. VI. See also P. II., S. II., III., IV., V. for the fact of the predominance of white bodies generally in the lactating as compared with the menstrual state.

35. The ovarian condition which most resembles what is here stated as occurring during lactation is that met with in amenorrhœa from disease, and as this, whether temporary and occasional, or even protracted, may obtain, contrary to the opinion of some, along with a plump state of both glands, and a profusion of Graafian vesicles, some of them of good size, and, in recent cases, of considerable density, nothing absolute can be founded on the fact of white bodies being discovered in the ovaries, independently of the other circumstances of the case, beyond a mere probability that it may have been connected with the puerperal condition, a probability which may safely be believed, however, to increase with the number of these bodies, and with the freedom from atrophy of the uterus and its appendages (P. I., S. III., IV., V.; P. II., S. VIII., IX. passim).

36. Graafian follicles of some size were found in the ovaries for fifteen, and white bodies for twenty years after the critical age (P. I., S. V., 2; P. II., S. IX. 3*a*, 5), and the discharge of attenuated minute vesicles, apparently simple cells, from the surface of these glands, appeared to terminate only with life (P. II., S. IX.).

37. No relation was found to exist between the number of corpora albida discovered in the ovaries after death and that of the previous pregnancies; nor was their any specific distinction in the ovaries of women who had borne children as compared with those of females who had not been gravid.

38. Numerous examples of amenorrhœa in its varied forms as connected with slight functional indisposition, pregnancy, lactation, organic disease, and old age, were observed, in which the ovaries remained of good size, and even in some instances (P. II., S. VI., 10) were larger than natural (passim).

39. Cases in which the ovaries were more or less crowded by well-developed Graafian vesicles coetaneously with the non-establishment of menstruation at puberty (P. I., S. I., 4, 6, 7, 8, 9, 10), and with its suspension by chlorosis (P. I., S. III., 1, 2, 3), and by pregnancy at the sixth week (P. II., S. I., 2), at the third (idem, 4) month, at the fourth (idem, 6 ?) month, at the seventh (idem, 7, 8) month, and by lactation at the first (S. II., 1, 3), fourth (S. V., 1, 4), fifth (S. VI., 1), and sixth months (S. VI., 1, 2, 4), were noticed.

40. Instances of one or more menstruations taking place in succession in the same female, without the corresponding rupture of a Graafian follicle, were often seen (P. I., S. II., 2, 3, 5, 7, 9; S. III., 2, 3 ; P. II., S. VII., 1, 3, 4, 5, 6, 7, 9, 10, 11, 12); and in some cases (P. II., S. VII., 1, 7) it was demonstrable that, although the ovaries were occupied by very vascular and distended vesicles, and menstruation was normal, no lesion of a follicle had occurred even after several months; while in one woman (P. I., S. II., 1) no less than eight, and in another (idem, 2) the strong probability of at least three times that number of consecutive menstruations having elapsed without the occurrence of that kind of rupture said to be essential to menstruation, was capable of proof; while in a third (idem, 3) there were no more than five of the large cicatrices and other indications described by some as following every successive menstruation, to set against at least three years of the probable subsistence of this function; and in no case was it found that there was any approach to an accurate relation between the number of foramina or of cicatrices observed in the ovaries, and that of the presumed menstruations previously undergone by the woman.

41. The uterine appendages were not on every occasion found remarkably injected with blood during or near to the time of the catamenial flow, and with one exception, in which the mucus of the tubes was of a red colour, most probably from regurgitation of the effused blood of the uterine cavity, the ovaries and tubes were even less turgid, in the few cases of actually existent menstruation which are recorded, than on some other occasions (P. I., S. II., 2; P. II., S. VII., 1, 6).

42. In some of the cases of the present series, as in others recorded by different observers, the vagina was found very red and vascular during menstruation (P. II., S. VII., 1).

43. The miliary-sized vesicles obtaining in the different forms of suppressed menstruation, instead of bursting and being discharged when they reached the external surface of the ovary, which was the rule, were seen sometimes to traverse a portion of the broad ligament, and occasionally to become solidified in this situation (P. I., S. III., 3; S. IV., 3, 6, 7; P. II., S. II., 5; S. VIII., 1, 4; S. IX., 4, 5).

44. A similar extrusion of corpora albida from the ovary to the broad ligament was also met with (P. I., S. IV., 6), and in both classes of cases a slender pedicular connection of the bodies with the ovaries was in a few instances observable (P. II., S. IX., 5).

45. In most of the examples of extruded vesicles here (43, 44) referred to, the Fallopian tubes were impervious (P. I., S. IV., 6; P. II., S. II., 5; S. VIII., 4; S. IX., 5), and in such cases the secretion by the ovaries of numerous transparent minute vesicles with fragile non-elastic coats, and the discharge of those, as appeared, into the abdomen, seemed to continue irrespective of the tubal obstruction.*

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* This fact is illustrated by many of the cases already recorded, but in the following, which was omitted in its proper place, it is seen in connection with the apparent persistence for a series of years without rupture of the vesicles peculiar to middle life (P. II., S. IX., 3: ——, above 60, the mother of a family). Both tubes impervious by adhesions of their fimbriated extremities, in which, and under the peritoneum covering the posterior aspect of the tubes, were numerous vascular vesicles, with dense elastic coats, and of about the size of coriander-seed, their contents when punctured escaping with a slight gush. On the ovaries were noticed another description of vesicles, so small as scarcely to be observed without a magnifier, some of them still imbedded in the surface of the gland, like eyes, and others protruding beyond it nearly with their whole circumference. They were quite pale and transparent, and very thin and non-elastic in their texture, and

46. The Fallopian tubes of women at seventy years of age were found patent (P. II., S. IX., 6).

47. Ovisacs containing altered blood or having their coats dyed black (corpora nigra) or yellow (corpora lutea), may occur independently of menstruation, and were, exclusive of the effusion of lymph from the extremities of the tubes and the exterior of the ovaries, which appear to have a similar origin, the only ovarian changes which could be suspected to have any connection with venereal orgasm (P. I., S. I., 7, 9; S. IV., 4, 5; P. II., S. III., 4; S. IV., 1, 3; S. V., 1, 2, 3; S. VIII., 1, 4, 5).

adjoining some of them were slight indentations which appeared to proceed from the recent rupture of some of their number. Interior of glands contained two well-formed corpora albida, and consisted of a membranous pulp, covered with extremely small-sized transparent vesicular points, or simple cells, similar to those on the surface.

CHAPTER III.

CONTRIBUTIONS TO THE PHYSIOLOGY OF THE HUMAN OVARY, BY DR. RITCHIE, OF GLASGOW. (SECOND SERIES.)

Female sexual organs.—Sexual character of the ovaries.—Fallopian tubes.—Uterine ovum.—Vesicles of the ovary.—Formative function of the ovary.—Seat of conception.—Evolution of ova.—Its connection with rut in quadrupeds and with menstruation in man.—Theory of menstruation.—Corpora menstrualia vel periodica.—General conclusions.

IN reverting to this field of investigation, the writer proposes to limit his observations to subjects of enquiry which are more immediately involved in the former series; and in arranging the materials of the present Contributions, his chief object has been to bring into view, in as succinct a form as is consistent with the copiousness and diffuse nature of the various details, the precise amount of our knowledge in this department of physiology, and at the same time to state and support his own opinions on the topics which are treated of, in such a way as the structure of his former paper, which was almost wholly a detail of facts, alike prevented and requires. This he would attempt under the following Sections:—

I. Female sexual organs.
II. Sexual character of the ovaries.
III. Fallopian tubes.
IV. Uterine ovum.
V. Vesicles of the ovary.
VI. Formative function of the ovary.
VII. Seat of conception.
VIII. Evolution of ova.
IX. Evolution of ova from ovaries in connection with the rut in quadrupeds, and with menstruation in man.
X. Theory of menstruation.
XI. Corpora menstrualia vel periodica.
XII. General conclusions.

I. *Female Sexual Organs.*—The female organs of generation were not supposed by the ancients to differ from those of the male, otherwise than in situation.[1] Retained within the pelvis by an imagined arrest of development, the effect, as was believed, of a relatively low degree of organic power, the ovaries were reputed as the analogues of the testes, the spermatic vessels being the types of the vasa preparantia, while the Fallopian tubes[2] with some, and with others[3] the ovarian ligaments, and with some again[4] the uterine and tubal branches of the blood-vessels of the ovaries, and with others certain imaginary passages believed to lead[5] from those glands to the cervix vesicæ, or to the os uteri,[6] or to the clitoris,[7] were regarded as the counterparts of the vasa deferentia.

II. *Sexual Character of the Ovaries.*—Hippocrates[8] ascribed an absolute parity of function to the female with the male testis; and Empedocles'[9] notion of the pre-existence in each parent of different portions of what after conception merged in the fœtus, if not admitted as the prototype of the union of the spermatozoon and ovum of modern physiology, may at least be allowed to indicate distinctly the correspondence in function which was then supposed to exist between the seminal glands of the respective sexes. The effects, in the destruction of the sexual passion and otherwise, of the removal of the ovaries from animals and women, were known to Aristotle, and have been insisted on by most succeeding writers on these subjects; while Galen, although ridiculing in strong terms the weak points of the hypothesis of Empedocles, has wrought out[10] a lengthened ratiocination in favour of the specifically parallel functions of the two sexes in the act of conception, founded on the alterations of species which result from the engendering of animals of different kinds, as of the horse and the ass, or of the dog and the wolf, which would serve as an excellent *à priori* argument in the present day for the existence of a female ovum. It may also, perhaps, serve to show the identity of character with the testis, which Vesalius[1] believed to attach to the ovary as the primary sexual organ, that, in speaking of yellow bodies which he had found within the ovaries of four unmarried women, this distinguished anatomist traces to their influence the strangulation of the uterus, the amenorrhœa and chlorosis, which the parties had suffered from before death.

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[1] Galen. de Usu Partium, lib. xiv. cap. 6.

[2] Galen. de Semine, lib. ii. cap. 1.

[3] Spigel. de Hum. Corp. Fab. p. 261. Mauriceau, by Chamberlayne, p. 25.

[4] Vesalius, lib. v. cap. 12, 15. Spigelius, lib. viii. cap. 20. Bartholinus, lib. i. cap. 27.

[5] Herophilus, in Galene de Semine, lib. ii. cap. 1.

[6] Riolan. Anthrop. lib. ii. cap. 35. Laurent. lib. vii. cap. 9. Revived by M. Gartner, of Copenhagen, and Dr. Dewees, Syst. of Midwifery, p. 73.

[7] Diemerbroeck, pp. 223-4.

[8] De Genitura, p. 12.

[9] In Galene de Semine, cap. 3.

[10] De Semine, cap. 1, *a*, *b*.

Hippocrates,[2] followed by Galen,[3] and the school of the latter, till the period of the discovery of ova in the tubes, maintained that the blood in the spermatic veins became converted, by its combination with the spirit in the accompanying arteries, while these lay entwined together in their serpentine course towards the ovaries, into a white-coloured viscid semen; while Aristotle[4] and the Peripatetics, and afterwards Pliny,[5] and some of the Arabian writers, substantially denied this in the case of the female, and ascribed to the semen masculinum the sole agency of conception, or divided this under various modifications[6] with the catamenial fluid.

III. *Fallopian Tubes.*—The uterine tubes, which have been so recklessly pronounced by a modern writer[7] to be impervious before puberty, and after critical age, reviving the obsolete notion of their cæcity,[8] which was asserted by some[9] to be situated at their distal, and by others[10] at their uterine extremity, were demonstrated by Galen,[11] and, after another long interval of belief in their imperviousness, again by Fallopius,[12] to be patent throughout their whole extent; and from finding their proximal ends in the quadrupeds he examined, as their distal in women commonly are, to be filled with a white fluid, the former writer considered the tubes to be true seminal ejaculatories, and mistook their normal secretion (described in the former series of these Contributions)[1] for the semen fœmininum, as the same material has repeatedly been since, for[2] that of the male. The impossibility of demonstrating the manner in which the presumed semen, however, passed from the testes to the tubes was, previous to the discovery of ova in both organs, and[3] the apposition of the one upon the other in animals at the time of rut, a source of much[4] perplexity to anatomists; some, as has been seen, supposing it to be effected through the tubal arteries,[5] and others more recently,[6] and even after the vesicular structure of the ovaries was understood, imagining that the seminal fluid was absorbed into the tubes from the ovarian cells by means of the fimbriæ, or directly by their abdominal orifices.

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[1] De Corp. Hum. Fabrica, lib. v. cap. 15, p. 460.

[2] De Genitura, p. 12.

[3] De Usu Part. lib. xiv. cap. 10.

[4] Hist. Anim. lib. i. cap. 20; lib. ii. cap. 4.

[5] Nat. Hist. book vii. chap. 15.

[6] Drelincurtius, de Concep. pp. 30, 32, 35.

[7] Gendrin, Traité Philosoph. de Méd. Pract. tom. ii.; Paris, 1839.

[8] Herophilus, in Galen. de Dissect. Uteri, cap. 9.

[9] Spigel. de Hum. Corp. Fab. lib. viii. cap. 20.

[10] Galen. de Semine, cap. i. ii.

[11] Ibid. lib. ii. cap. 1; De Graaf, de Organ. Generat. p. 312.

[12] Institut. Anatom. tom. i. p. 438.

The curved and sacculated configuration of the tubes near the corpora fimbriata, where their peculiar fluid in general collects, so as to distend them into a triangular pouch, and perhaps, also, by its action on the fimbriæ, to aid in shutting their open ends, was early[7] observed and described as vesiculæ seminaria. In occasional instances, both of women who have not borne children, and of such as have been mothers,[8] one and sometimes two portions of this vesicle-like process project from the line of the tube in the form of well-defined chambers or recesses. These affect a globular shape externally, and are sometimes so thin as to be translucent, while, internally, the muscular fibrils of the tube are gathered into bundles around the neck or orifice of the little chamber, the whole forming a structure not unlike a miniature hernial sac, and communicating the impression that the muscular layer of the canal had gradually given way under some mechanical force, such as that of the fluid of the tube frequently and strongly compressed,—distending the mucous lining and separating the muscular fibres, till at length the inner and outer, or peritoneal, coats were protruded beyond the muscular layer, after the manner of a direct ventral hernia, the fleshy fibrils of the latter being found arranged around its neck.

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[1] London Medical Gazette, vol. 1843-44.

[2] Fallopius, in De Graaf, p. 344; Ruysch, Thesar. vi. p. 15; Ruysch, Observationes, p. 60; Morgagni, Adversar. Anat. iv. 79.

[3] De Graaf, op. cit. cap. 16.

[4] Fallopius, op. cit. tom. i. p. 438.

[5] Plazzonus, in De Graaf, p. 333.

[6] Barthol. lib. i. cap. 27.

[7] Diemerbroeck, Anatom. p. 220. Hartmanii Dubia de Gener. in Hallere Disp. Anat. tom. v. p. 152.

[8] ——— ———, aged 20, died of fever. Believed to have been a prostitute and amenorrhœic. Tubes healthy, and each having a triangular pouch in far end, adjacent to open mouth. This cavity appeared, when the tube was slit open, to be formed by the muscular fibres being gathered into thick closely-set pillars, as a kind of embankment all round the neck of the sac, the bottom of the latter being thin and destitute of fibres. On pulling out the fimbriæ, some of them were seen to terminate at the edge of the sac by a broad triangular base of longitudinal fibres, arranged in bundles; and on each side of that of the left tube, a slender fleshy band was continued internally from the uterine aspect of the sac along either side of the latter, like a pair of ropes or the strings of a purse, to the abdominal mouth of the tube, where they were slightly adherent, and then terminated each in a free extre-

This modification of the form of the tube, which, if the above view be correct, is a morbid lesion, is more observable during advanced pregnancy, when the rest of the tubes are drawn out into nearly straight lines, than at other times, and was described by Roederer[1] under the name of Antrum Tubæ, and, although erroneously, was supposed by him to be produced by the detention in it of some of the fluid escaped from the walls of the ovary.

The ejaculatory function attributed by the ancients to the

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mity. In the opposite tube, the sacculated form was not so well defined externally, but internally, in the same situation as in the other, the muscular fibres were arranged around a thin expanded portion of the tube just as in the right side, except that here the two fimbriated side bands were situated without on the peritoneal surface.

—— ——, aged 45, a widow for six years, two children. The tubes very large and full of mucus. In one of them the apex of the usual triangular pouch-like portion, near the infundibulum, was extended into an acute point of about two-eighths of an inch in its long axis; and, nearer still to the fimbriated end, was another similar but smaller rising of the tube, separated from the first by a hollow notch; and internally, both of the sacs appeared to be produced by a thinning of the walls of the tube, at these points, connected with an arrangement of the muscular fibrils into bundles near their bases. In the second tube the sacculated form of the portion of it near the infundibulum was well marked, but there was no antrum; and the arrangement of the fleshy fibres was more equable, and did not leave any part of the walls of the canal thinned or deprived of a muscular covering.

[1] Icones Uteri Hum. Grav. de Tubo, passim. Montgomery, Signs and Symp. of Pregnancy, p. 247.

tubes has been noticed, and their structure, consisting, as was supposed, of an inner long and an outer shorter membrane, connected by loose cellular tissue, the lining membrane terminating in muscular fibrils having a systolic and diastolic power, and the interposed parenchyma admitting of turgescence and erection by whatever increased their contained blood; as also their conducting nature, and the property possessed by their fringed appendages of grasping and compressing the ovaries, were all familiar to physiologists in the seventeenth century;[1] while their fibrous structure, composed of a longitudinal and circular layer, was afterwards described by Santorini,[2] and has been confirmed by anatomists[3] of the present day.

IV. *Uterine Ovum.*—The oviform character of the conception, in whatever way acquired, was known from the earliest periods;[4] and the story related by Hippocrates,[5] so discreditable alike to his moral and perceptive powers, of the courtesan who aborted by his aid at the alleged seventh day after impregnation, continued to be adduced in proof of the opinion down to the time of Harvey;[6] when, owing chiefly to the excitement produced by the novel and erroneous speculations of the latter on generation, the sustained and lively attention of physiologists became directed to the subject; and Steno of Copenhagen, Kerckring, De Graaf, and Van Horne,[7] in particular, engaged each in a series of observations which terminated in the establishment of the fact, that all animals have their origin in an ovum, not formed, as had been supposed, however, in the uterus, from the admixture there of the seminal fluids of both sexes, or from the semen masculinum alone, nourished afterwards by the menstrual blood, or by a plastic power in the uterus communicated to it by the semen of the male, but existing, and that also previous to coition, in the testes of the female, in which it was supposed by De Graaf to be fecundated by an imagined spiritual part of the semen masculinum, conveyed to it, after the notion of Harvey's magnet-like influence, in the form of an *aura*.[1] Neither the idea of vesicles being contained within the ovary, and contributing in some way to impregnation, nor that of the membranes which afterwards enclose the fœtus in the womb having the form of an egg, were new to the physiologists of this period; but the statement now made for the first time by Kerckringius, and followed up simultaneously by so many others, that the non-testaceous egg within which the embryon in women and in quadrupeds is formed in the uterus, is nothing else than one of these vesicles loosened from its nidus in the ovary, and conveyed thence by the tubes to the womb, presented the whole subject of generation in an aspect entirely novel, although not absolutely true.

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[1] Drelincurtius de Tubis, p. 111. Ibid. de Conceptione per. v. ix. Haller, Elem. Physiol. tom. vii. p. 102.

[2] Obs. Anatom. p. 228.

[3] Velpeau, Traité des Accouchements, t. i. p. 85.

[4] Aristot. Hist. Animal. lib. vii. cap. vii. De Generat. Anim. lib. iii. cap. 9.

[5] De Natura Pueri, p. 16.

[6] De Generatione Exercit. 68.

[7] Dict. des Sciences Méd. tome xxxix. p. 9. Haller, Physiol. tome vii. p. 114. De Graaf, de Mul. Org. pp. 154, 334. J. Van Horne, Prodrom. Drelincurt. Adv. Cl. i. Kerckringii Anthropo. Ichonog.; et Stenon. Obs. Anat. Spect. Ova Vivipar. in Bib. Anat. Mang. t. i. p. 482.

V. *Vesicles of the Ovary.*—The cellulated structure of the ovaries was known to Galen and all his followers,[2] and was described sometimes as consisting of vesicles, and at others as made up of hydatids. Their chief mistake lay in regarding this vesicular tissue as a congeries of seminal vessels, which terminated in a vas deferens exactly as in the male; and the physical qualities of the contained fluid, so different from those of the semen virile, and which caused it to be compared by Vesalius,[3] and many succeeding copyists, to the serum of milk, and by others[4] to the albumen of egg, appear to have given occasion at once to the notion embraced by the Galenists, of its relative weakness, and to that held by their opponents,[5] that it was simply a fertilising liquor with which the uterus, like a field or garden, required to be irrigated in order to being made prolific on the accession of the semen masculinum.

Kerckring, De Graaf, and his coadjutors, whose investigations were made about 1670, and between whom a controversy,[6] not unlike that recently maintained[1] by other parties on almost the same subjects, was hotly waged, misled in their turn[2] by the supposed identity of the contents of these vesicles with those of the eggs of birds, bestowed on them the name of ova; and although encountering much opposition[3] and ridicule, Steno and De Graaf did not hesitate to assert that the sole use of the female testes, which they now called ovaries, was to secrete and maturate these ova.—It is evident from De Graaf's descriptions, indeed, that he had misgivings as to the completeness in every particular, in the case of the mammalia, of this supposed analogy. Thus, at page 348, he speaks, in reference to rabbits, of a body being deposited after impregnation *within* the *coats* of the *ovum*, which *surrounds* or *involves* the *ovum*, and by forcibly compressing it causes its expulsion into the tube, where it is found (p. 401) *ten times smaller in size* than before it left the ovary; and he illustrates his description by a plate (Tab. xiv. fig. 4), in which the proportions of the so-called ovum, as seen in the thickened calyx which remains in the ovary, are contrasted with those of the presumed true ovum now removed from its nidus. Malpighi,[4] who, contemporaneously with De Graaf, had seen the ovum in the tube, and would therefore be familiar with its minuteness as compared with the size of the ovarian follicles, ten years[5] after the publication of De Graaf's work, suggested that the vesicles of the ovaries were not themselves ova, but were intended by the union of several of them together to form, deposited on their interior, the substance (corpus luteum) spoken of by De Graaf, from which the ova should afterwards be separated as from a filter; and in 1718, Morgagni,[6] reasoning on the discrepancies already referred to in De Graaf's descriptions of the ova, still more remarkably than Malpighi in the above hypothesis, anticipates a discovery of later times by asking—

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[1] De Graaf, passim.

[2] Galen. de Dissectione Uteri, cap. 9. Vesalius, lib. v. cap. 15. Fallopius, Op. Om. Venice, 1606, tome i. p. 106. Riolanus, lib. ii. cap. 37. Laurentius, lib. vii. cap. 10.

[3] De Corp. Hum. Fabrica, lib. v. cap. 15, p. 458.

[4] Rod. a Castro, de Natura Mulier. lib. i. cap. 4.

[5] Cremonius, quoted by Bartholin, lib. i. c. 26.

[6] J. Swammerdam, Miracul. Natur. sive Uteri Mulieb. Fab. De Graaf, Partium Genit. Defensione.

'Quanto ergo proclivius est conjicere, vesiculas esse glandulas eum quem continent, humorem secernentes, ut in ipso

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[1] Negrier, Gendrin, Power, Lee.

[2] Hall. Physiol. vol. vii. p. 114. De Graaf, p. 298. Kerck. Anth. Ich. p. 1.

[3] Verheyen, Ph. sup. Anatom. H. v. cap. 11. De Graaf, p. 302.

[4] Epist. ad Oldenberg, No. 5.

[5] De Vivipar. Ovis, p. 223.

[6] Adver. Anat. iv. Animad. xxviii.

ovulum et tutius asservetur, et facilius cum tempus est, incipiat expandi; esse, inquam glandulas quarum partes eodem tempore, eandemque ob causam amplificentur non tantum ut distracta, et ad extremum pertusa ovarii membrana, *ovulo* exitus paretur, verum etiam ut novum tunc nutrimentum eidem *ovulo* suppeditetur, vel plus humoris exprimatur quo ipsius *ovuli* exitus, et per tubam delapsus facilior fiat.'

An uncertainty and vagueness, not unlike that which previously distinguished every description of the relations of the female testes with the uterus, became now characteristic of the views entertained regarding the nature of the Graafian vesicles;—some esteeming[1] them to be simple vesicles, others[2] as consisting of a vitellus inclosed within a membranous calyx, but both acknowledging them to be genuine ova; while another class[3] asserted that they were rudimentary structures only, which furnished on their impregnation an amorphous substance, that acquired an ovoid character in the tube; others maintaining again that the ova were really formed within the ovarian cells, but not till these had assumed the type of corpora lutea,—a transition which was effected, according to some,[4] by impregnation, and to others[5] by the organic power of the ovary itself, converting what was originally a simple serous membrane into a complicated glandular structure.

The master difficulty with all was the fact, that never in the experiments of any one could vesicles similar to those in the ovaries be detected either in the uterus or in the tubes. Those asserted to be found were admitted by their discoverers to be much smaller; but in nearly a hundred dissections[6] made by Haller, he failed to discover ova at all,[7] in any animal, before the thirteenth and seventeeth days post coitum, or to observe any substance in the tubes except a tenacious albuminous mucus. Cruikshanks[8] afterwards verified De Graaf's observations, having detected ova in the tubes of rabbits before the third, and often in immediately subsequent days; and he declared his belief that they were produced within the ovarian vesicles by conception; but so influential were Haller's views, that we find them reproduced in the same volume which contains Cruikshanks' paper, in an essay of Dr. Haighton's, which is as remarkable for the excellence of its facts, as, from the adoption of some other opinions of Haller, it also is for the erroneousness of its conclusions. And again, writers even so recent as Blumenbach[1] and Bostock[2] described the product of the Graafian vesicle toward conception as being nothing more than an albuminous drop; and as late as 1835, when the discovery of the ovum had been actually made by separate observers, and in different quadrupeds, the influence of previous opinions is very remarkable, in the assertion of Dr. Lee, that it was problematical whether an ovum[3] ever passes along the Fallopian tubes into the uterus either before or after conception.

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[1] Roederer, p. 39. Nigri soli, quoted by Haller, vol. vii. p. 113.

[2] Vide Haller's Phy. vol. viii. p. 40. [3] Haller, &c. [4] De Graaf, &c.

[5] Malpighi, &c. [6] Physiol. tome viii. p. 44. [7] Idem, p. 58.

[8] Phil. Trans. vol. lxxxvi. p. 197.

Passing over the observations of Vallisneri, Santorini, Sir E. Home,[4] and M. Plagge,[5] resuscitated lately by Negrier,[6] all of whom, equally with Malpighi, the first of this sect, and also De Graaf, have mistaken the discharged and shrunk cadaver of the Graafian vesicle (with its two coats surrounded by granular matter), within the corpus menstruale or luteum, for the true ovum; and omitting, also, more than a notice of the perspicuous generalisation which enabled Baron Cuvier,[7] although ignorant apparently that it had been done before, from the observation of their structure in other classes of animals, to predict the existence of germs, irrespective of connection with the male, in the ovaries of the mammalia, it was reserved for MM. Prévost[8] and Dumas, who failed, however, to appreciate the importance of their discovery, and more particularly to Von Bäer,[9] whose observations were corroborated almost contemporaneously by M. Coste,[10] and afterwards by M. Valentin,[11] to terminate this point of the enquiry by the discovery within the unruptured ovarian follicle, and unconnected with conception, of the true ovum itself, not more than from one-tenth to one-twentieth of a line in diameter, and scarcely visible to the naked eye.

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[1] Inst. Physiol. i. p. 424.

[2] Physiology, vol. iii. p. 31.

[3] Cyclop. of Pract. Med. vol. iii. p. 228.

[4] Phil. Trans. vols. cvii. cix.

[5] Journ. Comp. de Dict. des Sciences Médicales, tome xv. p. 184.

[6] Recherches sur les Ovaries; Paris, 1840.

[7] Leçons d'Anat. Comp. 1815.

[8] De la Génération dans les Mammif.; Ann. des Sc. Nat. tome iii. p. 135.

[9] De Ovi Mammal. et Hominis Genesi, p. 12.

[10] Recher. sur la Générat. des Mam.

[11] Symbolæ ad Ovi Mam. Histor. ante Impregnat.

The subsequent additions made to our knowledge by M. Coste[1] and Wharton Jones,[2] in the interior of the ovum, of another vesicle of about 1-900 of an inch in diameter, termed from its discoverer in birds the vesicle of Purkinje, or germinal vesicle; and, again, by Mr. Jones and Rudolph Wagner,[3] on the germinal vesicle, of a mass of fine granular matter of from 0.0003 to 0.0004 of a line in diameter, the germinal spot; and, more lately, by Dr. Barry, of a structure within the Graafian vesicles, the *retinacula*, which he thinks intended to suspend, and on its maturity to expel the ovum, but which opinions have been since disputed by M. Bischoff,[4]—require, as do also the other deeply interesting researches of Dr. Barry,[5] and also of M. Bischoff, on the development of the Graafian vesicle, to be referred to only in this paper.

VI. *Formative Function of the Ovary.*—One of the points of view in which it became usual, after the period of De Graaf's discovery,—or, more correctly, after Haller's exposition of that discovery,—to regard the ovary, was as a mere capsular envelope of a definite and ultimate number of vesicles appended to the uterus, rather than as itself, at least in the unimpregnated female, the primary sexual organ, endued with the power of secreting ova throughout the whole term of existence, and of influencing powerfully the development of the other sexual parts.

The writer, in reference to this latter aspect of the enquiry, would advert only to the control exerted by the ovaries in bringing out the female type of the pelvis, &c. at puberty, as illustrated by Dr. Laycock, and to the additional evidence of this which is afforded by the resuscitation of many of the peculiarities of male development, both in women and in animals, which occurs on the destruction of the ovaries; and would limit himself here to a remark or two on the former of the points mentioned—the secreting properties of these bodies as glands.

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[1] Op. cit. p. 28.

[2] Lond. and Edin. Philos. Mag. Sept. 1835. [3] Müller, Archiv. 1835.

[4] Traité du Développement de l'Homme et des Mammifères. Paris, 1843.

[5] Researches in Embryology, first series, Phil. Trans. vol. cxxviii. p. 301; 1838. Second series, Ph. Tr. vol. cxxix, p. 307; 1839. Third series, Ph. Tr. vol. cxxx. p. 529; 1840.

The number of vesicles in the ovaries was stated by De Graaf to be about twenty in each, and by Roederer to be as high as thirty, forty, or even more; but Haller, who had never observed more than fifteen in any instance, and who, denying the possibility of their reproduction when once evacuated, supposed this to be the full complement ever possessed by the human female throughout life, influenced by his authority the descriptions of succeeding anatomists to the present day, when it has been shown that the number of ovarian follicles, although varying according to circumstances, is, in general, greater than had been previously believed, and is besides capable of an indefinite extension. Raciborski,[1] by cutting the gland into three parallel portions in the direction of its length, has counted upwards of forty vesicles in one ovary. The writer,[2] who has ascertained that the power of their reproduction exists to a high degree in the human female from the earliest periods of childhood to the most extreme old age, and also with respective modifications during gravidity (see Cases I., II., and III., at end of paper), lactation, and other suppressed forms of menstruation, has observed that their number is influenced conversely by their degree of organisation. When large, vascular, and possessed of tenacious coats, and their granular fluid of good consistence and a high colour, they are in general comparatively few in number, and appear to attain their growth, and to penetrate the ovary in a relatively gradual way; but, in amenorrhœa, whether natural or abnormal, when, according to the intensity of the cause which arrests the menstruation, the vesicles are either smaller and thinner than those just described, or are reduced to miliary-sized cells, with vascular coats, or, as in the most confirmed cases, to colourless vesicular points, their number becomes proportionably great, and is sometimes incalculable.

It would appear (vide First Series, Part II., sections 1, 2, 3,

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[1] De la Puberté et de l'Age Critique chez la Femme, et de la Ponte Périodique chez la Femme et les Mammif. p. 97, 1844.

[2] London Med. Gazette, 1843-4.

4, 5, 6, passim) that during pregnancy, the Graafian vesicles seldom become so attenuated as they are found to do in the amenorrhœa of disease, and that, on the contrary, they are often then very vascular, large, and well organised. It is an inquiry worth making, whether the presence of abnormal phlogosis of the uterus, as in some uterine affections, has any similar effect in suspending, despite the amenorrhœa, the usual atrophy of the ovaries and their follicles, which is incident to serious disease (see Cases IV. and V. at end of paper.)

Another point of interest connected with the organic power of the ovary, is the capacity which it possesses of accommodating its action to existing and varying circumstances. One important exemplification of this is presented by the differences in amount of organisation of the Graafian vesicles in the various periods of female life, to which reference has been in this section made, and, also, by the very opposite methods in which these vesicles are ultimately disposed of according to the degree of their organisation. Thus, in early infancy, and in old age, when the ovaries are supererogatory, their vesicles are of so cobweb a texture, that in the dead subject, a few minutes' exposure to the air suffices, sometimes, to rob them of their contents; and in the living, they are fitted to give way under the gentlest pressure of the fimbriæ, or, in default of this, to be discharged with innocuousness into the abdomen. During the period of child-bearing, again, when of course the ovary is the most essential organ of the female economy, and each of its follicles has become a complex aggregation of cells, the coats of such follicles acquire a firmness of contexture which effectually preserves their important contents from being wasted on every occasion of excitement to which the ovaries at this period of life may be exposed, and which, indeed, but for the additional absorbing powers acquired by the ovaries along with menstruation, would prove an effectual barrier to the due exercise of the reproductive function. Again, in pregnancy, the physical difficulties presented to renewed impregnation by the situation of the ovum within the uterus, are not of that nature which would prevent superfœtation being a frequent occurrence, were it not that the structure of the ova in this condition becomes so imperfect, that their successful fecundation is commonly an impossibility; and in lactation, again, the recurrence of gravidity would be more common at an early period than is the fact, were it not for the sanative operation of the same cause.

It is a distinctive character of the openings made in the peritoneum over the ovarian vesicles of menstruating women, that, while those in the amenorrhœic, or non-menstruating female, are punctate, these are uniformly linear or crucial, as are also their cicatrices. The opening in the walls of the vesicle is in all cases circular, and corresponds to the minute size of the ovum; but, in the menstruating woman, that made in the walls of the ovary is greatly larger than in other women, and always affects a linear form. This difference is perhaps dependent on the greater activity of the ovaries in menstruating than in other women, and probably is intended to furnish facilities for the speedier and more frequent discharge of mature vesicles than is either competent or desirable when the menses are absent.

Such a use of menstruation is rendered feasible, not only on the grounds stated, but also from a fact which may serve to illustrate further the accommodating faculty of the ovaries at present under notice. When a crop of mature well-developed follicles has been formed in a menstruating woman, and the catamenia are suddenly arrested, the further growth of similar sized vesicles is also stopped, and those actually existing, instead of being discharged as formerly by rupture, move off in a crowd between the layers of the broad ligaments, and sometimes steal along the outside of the tubes as far even as the fundus of the uterus. In these situations their vascular connections become atrophied, and their nutrition being consequently destroyed, their fluid contents are generally disposed of either by absorption or transudation, while their solid particles remain embedded as harmless foreign bodies in their new location; and, in the meantime, the plastic power of the ovaries being reduced to the amenorrhœic type, structureless vesicles only continue to be discharged by these bodies, agreeable to the constitution of their new condition.

Again, should one of the Fallopian tubes become impervious, a similar arrest of matured vesicles has been found associated with it, but only on the corresponding side; and the writer thinks that there are good grounds for believing that when both tubes are shut, the operation of the alleged intuitive-like control of the ovaries over their own functions, to which he has referred in this section, speedily suspends menstruation, and the secretion also of any other than such minute, colourless, and pellicular vesicles, as may burst into the abdomen with impunity.

Case I.—Mrs. ——, aged 45, a widow, with a family, the youngest six years of age. Died two days after admission into fever house, and was said to have had a sanguineous discharge from uterus fourteen days before, but no evidence of the existence of pregnancy or of an abortion could be had. Uterus about a fourth larger than natural. Orifice lay open, and occupied by a clot which filled the cavity and cervix, and which had begun to be softened and decomposed at the fundus. Tube of right side very vascular, and its veins turgid; that of left impervious, and its exterior occupied by several small vesicles, which had apparently passed to it from the ovary. Each ovary measured about two inches in its length, by about one in depth, and a quarter of an inch in its thickness. They were pale, smooth, and punctate, with vesicles of most minute size; on the posterior surface of the right, there was a yellow spot of about two lines diameter, perforated in its centre by an opening, which admitted a bristle, and communicated with a beautiful cephaloid cyst of the size of a hazel-nut.

Case II. ——, aged 42. Large family; youngest fourteen months old, and at breast. Ovaries smooth, pale, and sprinkled with delicate, transparent, and colourless vesicles of small size, some still embedded in glands, and others protruding from surface by nearly their whole circumference. Each ovary contained only the remains of a soft corpus albidum, lying under the faint vestiges of a cicatrix.

Case III. ——, aged 23. Amenorrhœa of six months' standing from granular kidney. Uterus slightly below the average virgin size. Tubes pervious, both having an antrum at their ovarian extremities, which, on being inflated, appeared, from the thinness of the walls of the tube, translucent, the muscular fibres being separated into masses collected around the brim of the antrum. Ovaries plump, and their interior full of a succulent pulp, consisting of numberless transparent vesicular points, scarcely visible to the naked eye, and containing, also, beneath the peritoneal covering, many vascular Graafian follicles of the size of mustard-seed, and some even larger, which projected from the surface of the ovaries, which they had begun to thin and to render vascular. Anterior aspects of both ovaries occupied externally, and the posterior aspects of both tubes, and the free ends of all the fimbriæ, by transparent colourless vesicles, of the size of a grain of sago, or larger, many of which had been solidified apparently from absorption of their more fluid parts.

Case IV. ——, aged 40. Death from fever. Presumed to have been amenorrhœic, but had a brown vaginal discharge. Uterus larger than natural, its orifice and inferior labium particularly, of an ink colour, and the seat of an indentation of more than an inch across, and about an inch upwards, which was produced by an ulceration of the substance of a ragged, pulpy character, still having the mucous covering of the labium extended across it, and fallen down into it, but cribrated by numerous foramina, and capable of being raised by the blowpipe. Parietes of the uterus thickened. Tubes impervious. The right ovary somewhat enlarged, but shut up in a reduplication of the broad ligament by firm adhesions; on opening which, the ligament was seen to contain numerous small bodies of the colour and consistence of candied sugar, which suggested the idea of their being solidified vesicles. Left ovary also above medium size, and its anterior aspect and the posterior surface of the tube had several small colourless vesicles in their walls; while the interior of the gland was filled with a moist, lamellated pulp, in the layers of which numerous small pale vesicles were suspended, some of which had burst on the surface of the ovary.

Case V. ——, death from cancer of the uterus, nearly a half of which was destroyed. Ovaries large and plump. Numerous pale, transparent vesicles, of the size of a small pin-head and less, and filled with limpid fluid, were seen on the exterior of the glands; and internally the parenchyma was sprinkled throughout with similar cells, mixed over its surface, and under the peritoneum, with a number of vascular follicles as large as coriander or hemp seed, and with as many as five dense corpora albida adhering to the ovary by their pellicular envelopes.

VII. *Seat of Conception.*—Another position assumed by De Graaf, which had been maintained previously by Warton,[1] and was afterwards supported by Haller and almost all succeeding physiologists, was, that impregnation was accomplished always in the ovaries; the tubes conveying the vivifying principle of the male *inward*, and not, as had been believed by the ancients, in the uterus; the female prolific matter passing *outward.* The reasons assigned for this opinion were, and still are, that fully-formed fœtuses are sometimes found in the ovaries; that in the experiments of Harvey and of Haller, the semen masculinum could never be detected in the uterus *post coitum*; that it was sometimes, as was alleged, seen, however, in the tubes, and on some occasions has been seen on the surface of the ovaries; that when a ligature was placed around the cornua uteri of a mammiferous animal three days after conception,[2] two fœtuses were afterwards discovered between it and the ovary, that in dogs and rabbits recently dead, or still alive, the tubes have been observed to possess a rapid narrowing motion, passing in the direction of the ovaries; that the movements of the spermatozoa of the male are accomplished with a force which is sufficient to displace crystals ten times as large as themselves, and with a velocity equal in a right line to an inch in seven and a half minutes; that in the domestic fowl, many eggs are fecundated by one coitus; that the same happens in the viviparous animals; that in woman, also, two, three, and sometimes four ova, are impregnated at once; and that every sexual congress is followed by remarkable changes in the structure of some of the Graafian vesicles.

In reply to which considerations it has been, or may be urged, that if you kill a doe rabbit just impregnated, and while she is warm introduce a blowpipe into the vagina, no air will enter the Fallopian tubes, or even the uterus; but that if you insert the pipe in a Fallopian tube, the air passes readily into the uterus and vagina; that whatever may be said of the peristaltic motion of the tube, it is certain that the vibratile movement of its epithelium is towards the uterus, and that this ceases after the passage of the ovum; that, in point of fact, ova do pass from the ovaries to the uterus; that extra-uterine conception may occur as the exception, but not as the rule; that the semen masculinum has been detected in the uterus by the microscope *post coitum*; that all the statements of this fluid having been found in the Fallopian tubes of the human subject are unworthy of credit; that even in quadrupeds the semen does not penetrate the ostium uterinum of the tube before the eighteenth or twentieth hour *post coitum*, or later; and that, unless in the case of two dogs, by Bischoff, of another dog by Wagner, and in two instances in rabbits by Barry and Bischoff, the semen has never been found on the ovary; that in Pouchet's[1] experiments on rabbits, the zoospermes all died by the twenty-third hour after the access of the male, at which time they had scarcely penetrated a perceptible distance within the tubes; that it is physically impossible, even should the semen virile reach the ovary, for its denser, which has been proven[2] to be its fecundating part, to penetrate the peritoneal coat of the ovary, the stroma, the coats of the vesicle, the granular fluid, and afterwards the ovum; that the expulsion of ova happens irrespective of coition,[3] both in women and in quadrupeds, in such numbers as easily explains the occurrence of plural conceptions, but that, instead of twin births happening in the human female only once in every sixty-nine or seventy deliveries, as is the fact, they would, had the ovaries been the seat of conception, have been the common form; and that the changes in the Graafian vesicles, supposed formerly to have been peculiar to fecundation of the ova, have now been demonstrated to occur independently of this cause; while, finally, the appearances observed in the ovaria of mammals *post coitum* are utterly valueless in regard to any definite principle of development or order of succession, and would have been found in the same animals at the same periods, although no copula had intervened. That the experiment of Nuck is without weight in this enquiry, as it is known that the seminal corpuscles often extend to the tube in quadrupeds before the third day; that in the experiments of Haighton on rabbits, the corpora fimbriata were found in their natural situation a few minutes after coition; that in one case [1] impregnation did not occur, although the left tube was divided so late as four hours after the access of the male; and that, in regard to birds, the quantity of semen necessary to fecundation is so infinitesimal, that enough may remain in the oviduct, after a single approach of the male, to impregnate all the ova which are discharged for a short time succeeding.

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[1] Warton, Adenograph. cap. 33.

[2] Nuchii Adenograph. p. 69. Philosophical Transactions, vol. lxxviii, pp. 129, 175.

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[1] Arch. Génér. de Méd. Jan. 1845.

[2] Spallanzani, Diss. di Fisica Anim. et Veg. Prévost et Dumas, Ann. des Scien. Nat. t. iii.

[3] Contributions to Physiology of Ovary, Med. Gaz. 1843-44.

No analogy favourable to the ovarian hypothesis of conception can with safety be instituted between quadrupeds and women. In the latter, the uterine extremities of the tubes admit a bristle only; in the former they are large and patent. Whatever is fitted, on the contrary, to indicate the uterus as the seat of this process in animals, possesses a more remarkable power of application to the human female.

The experiments of Haighton on rabbits,[2] and, more lately, of Blundell,[3] in which, by preventing the access of the male fluid in the oviducts, sterility occurred, although corpora periodica, or lutea, were formed, if they are read in the light of our present knowledge of the habitual discharge of ova by animals and women, independently of sexual intercourse, abundantly prove that the argument for conception being accomplished in the ovaries, which is raised on the fact of the presence of corpora lutea within these glands, is without foundation; a notion which has been refuted in multiplied ways in the present day, but in connection with experiments on quadrupeds, more especially by those of Bischoff,[4] in which he extirpated the uteri and tubes of bitches and rabbits, and found that the animals afterwards had heat, and discharged ova into what remained of their tubes, precisely as when the continuity of these was preserved; and more lately still, by the dissections made by the latter observer,[1] and by M. Raciborski,[2] of dogs and other animals, while emerging from rut, in which ova were found in the tubes, and corpora periodica or lutea in the ovaries, although the animals had had no connection with the male.

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[1] Phil. Trans. vol. lxxxxvii. p. 185. [2] Phil. Trans. vol. lxxxvii. p. 159.

[3] Researches Physiological and Pathological, 1824.

[4] Ovologie, par Bischoff, in Encyclop. Anat. tom. viii.; Paget's Analysis, Brit. and For. Rev.

In the dead human subject,[3] a fluid of the consistence of milk, if allowed to rest on the uterine extremity of either tube, will be gradually absorbed into its cavity: and in women who have died while menstruating, blood is often [4] found in one of the tubes; and in some instances [5] it has reached to the fimbriated end, and been observed as a clot resting on the ovary; while in some puerperal women death has been said to have occurred from the escape of blood into the abdomen.

Such facts prove the possibility of some of the semen virile, its motor parts for example, (if received into the uterus during the relaxation of the organ, and its occupation, as in menstruation, by a fluid capable of diluting, and, perhaps, also of conducting the semen,) passing gradually to the ovary; and as ova are projecting from time to time into the tubes, and are probably retained there for a varying period before their transmission to the uterus, the compatibility and rationale of a tubal conception are obvious; while, as respects what is termed ovarian gestation, although the fecundation of the ovum in an *unruptured* vesicle appears to be impossible, it must be admitted that, despite the discharge of an ovarian follicle being so energetic [6] that the detension of an ovum at its orifice, or within its perforated cavity, can scarcely occur; and also that before such an ovum is impregnated there must be the abnormal presence of seminal corpuscles at the infundibulum of the tube, and the suitable apposition of the latter to the abraded ovary and ruptured vesicle: the competency, viewed in the abstract, of a conception to happen, under such an extraordinary combination, is, however, as indisputable, as the fact that its occurrence is a subject of actual experience.

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[1] The periodical maturation and extrusion of ova, independently of coitus, in mammalia and man, proved to be the primary condition to their propagation, by Th. L. W. Bischoff, &c.

[2] Op. cit. p. 376.

[3] —— ——, death from albuminuria. Mother of three children, youngest nine months old. Uterine ends of Fallopian tubes considerably smaller than the smallest sized pin-heads; not entirely circular, but having an appearance of arching in upper part, and of a subsidence of the rima at inferior edge. Milk passed from them slowly into the tubes, and quite readily when they were extended by pressure.

[4] First Series, *passim.*

[5] M. Ruysch, Thesaur.

[6] *First* Series, Summary.

Fluid injections, again, if introduced in the dead body from the os uteri by a strong syringe, pass out readily by the abdominal ends of both tubes, but the *per saltum* passage along the tubes of the living human subject of a substance of the density of semen masculinum is, apparently, incompatible with the physical conformation of these ducts, and, besides requiring for its accomplishment an inversion of their action which is purely hypothetical, demands, also, either that the tubal fluid,[1] usually present in considerable quantity, shall be carried out into the abdomen before the semen, in which event it is not easy to see why the semen should not follow it, or, again, that there should be set up at the same moment in the tubes double and conflicting series of muscular contractions, and double and opposing currents of contained fluid.

In opening the uterus of the human female its internal and lateral paries is occasionally found occupied by a large irregular patch of the fluid of the tubes, and in the rabbits with interrupted vaginæ admitted to the male by Dr. Blundell, the uteri after numerous repetitions of the sexual act became enormously distended with albuminous fluid, secreted no doubt in part by the uterus, but proceeding also in considerable measure from the cornua and tubes.

Reviewing, therefore, these varied considerations, and referring, also, to those changes in the yolk which occur while the ova of quadrupeds are yet within the tubes, and which are supposed to be the exclusive effects of fecundation; and, likewise, to the alleged formation in the same subjects and situation of the chorion, the writer is yet constrained, in regard to the human female, to revert fully to the ancient theory, that the sacculated distal ends of the tubes are true receptacula seminalia aut ovorum; that the tubes are deferent and ejaculatory canals or oviducts; and that the normal seat of conception is the uterus.

VIII. *Evolution of Ova.*—Another mistake of De Graaf, not less prolific of error, concerning the true functions of the ovary, than were his views of the anatomy of the ovarian vesicles and of the seat of fecundation, and which, although rejected by many of his contemporaries, has also received a more remarkable refutation in our own times, was his assertion, that the ova of quadrupeds, and of the human female, are separated from the ovary only by impregnation. This he supposed to be accomplished, as already stated, by the formation, a few days after conception, of a substance within the follicles (termed by him ova) of the ovary, which, from its structure, he called corpus glandulosum, and which, having gradually involved the ovum in a vesicle, eventually, by its contraction and weight, expelled that body through a minute opening or papilla in its walls.

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[1] First Series, *passim*.

Aristotle,[1] Galen,[2] Harvey,[3] and every other writer on the generation of animals before De Graaf, had referred to the addle or sterile eggs discharged, as the independent act of the ovaries, by virgin birds, and by fishes and insects, as also, 'seminis muliebris evacuationi sine maris congressu;' and, under the name of ova, to the discharge by women, (but only after presumed impregnation,) of vesicular or other molæ. Vesalius,[4] also, and perhaps others before De Graaf, had observed the corpora glandulosa of this writer in the human ovary, and may have supposed them to possess a sexual origin, but this does not appear; and the idea of an ovum being separated from the ovaries of women or quadrupeds by other causes than the approach of the male, does not seem to have been suggested by any one before Kerckringius, whose work was published while that of De Graaf was passing through the press.

In the account of this writer's opinions given in the seventh volume of the 'Philosophical Transactions,' which is only a compilation from the reports of French journalists, the fact of *fecundated* ova being aborted at the menstrual periods, and in consequence of paroxysms of anger, is stated, but it has been omitted to mention that Kerckringius, in his own memoir, announces the additional fact of the *unimpregnated* ova of the human female being discharged often during the *flow of the*

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[1] Hist. Anim. lib. vi. cap. 2.

[2] De usu partium, lib. xiv. cap. 4.

[3] Exercit. v. xiii.

[4] De Corp. hum. fab. lib. v. cap. xv.

menses, or owing to sexual excitement. His words are :—Tam conjugatæ autem, quàm *virgines*, hæc ova sæpissimè excernunt, *insensibiliter quidem, quia non advertunt*, nec *quicquam de iis suspicantur*: sed, quod mihi ex relatione quarundam constat, sentiunt, dum reflectunt; cum autem excreta sunt, paulò quàm hic depinximus, sunt majora, nec, quia mollia sunt et laxa, rotunditatem suam servant, et, si manu tractentur ac diducantur, membrana manum sequitur: unde patet ea non semen, aut quid simile esse, sed ipsa hæc, de quibus loquimur, ova: *et hœc excretio potissimum instante purgatione menstruâ, aut alias stimulante libidine accidit.*

It is obvious that the bodies which Kerckringius here describes were not ova, but most probably, were portions of fibrin. His statement was received by contemporary physiologists, notwithstanding, as the announcement of a possible fact, and one of these, M. Denys,[1] commenting on it, anticipates, in one remark, the whole principle recently brought out so laboriously by M. Pouchet,[2] that 'all other animal creatures, not to speak now of plants, are produced by means of eggs, as birds, insects of all sorts, fishes, and *why not quadrupeds, and females of mankind?*' and, in a succeeding observation, he attains to the same conclusion with the writer of these contributions, that these ova are in general fecundated within the uterus, and not in the ovaries.

Such were the floating opinions, the *obiter dicta* in these matters, which prevailed at the time when De Graaf wrote, and it is one of the most curious particulars in this enquiry, not that De Graaf, with such analogies to guide him, should have discovered ova in the tubes of quadrupeds post coitum, but that it should not have been till nearly two centuries later that they were found in the same situation irrespective of the influence of the male.

The immediate cause of this arrest in the progress of discovery was the belief that the structure called corpus glandulosum was a mechanism essential to the separation of ova from the ovaries, and exclusively a product of impregnation—a notion which, having received the sanction of De Graaf, and afterwards the strenuous advocacy of Haller, and the support of most succeeding German and British physiologists, although repudiated by others, has maintained its ground as a serious hindrance to the attainment of a correct theory of generation to the present day.

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[1] Ph. Tran. vol. 7.

[2] Théorie Positive de la Fécondation des Mammif.

The first writer who formally disputed the hypothesis of the essentially fecund nature of the extrusion of ova, was Malpighi, but, unfortunately for science, he did this through the medium of another speculation, that of the secreting function of the corpora glandulosa. Having often met with this granular matter, termed by him, from its colour, corpus luteum, within the ovarian vesicles of new-born calves, and perforated by an opening in other animals in the time of rut, although secluded from the male; and, also, in pregnant cows and other animals, and in women at the seventh month—in none of which any correspondence obtained between the size or number of the corpora glandulosa, or lutea, and the period of gravidity or the number of fœtuses, and in none of which, also, was there any ground to suspect superfœtation; and having, besides, as he imagined, observed the cysts to contain within their centres ova of the size of millet-seeds, he broached the opinion that they were glands—existing long antecedent to impregnation, and designed for the secretion, and, by means of the contractions of the fimbriæ, the separation of mature ova, which might either be fecundated within the tube, should they come into contact with the semen of the male, or, in default of this, be discharged as sterile, precisely as in birds.

An immediately succeeding writer, who followed in the same direction, was Drelincourt.[1] He assumed the pre-existence of fleshy and fibrous capsules (corpora lutea) in matured ovarian vesicles, which, by their pressure, aided in the venereal oestrum by the contractions on them of the fimbriæ of the tubes, caused the riper ova to be absorbed in a state of integrity into the latter and thence into the uterus, where they were either impregnated or washed away.

Consecutively to Drelincourt were Newman,[2] and various Italian physiologists, terminating with Bertrandi, who wrote in

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[1] De Fœminarum Ovis, 1684.

[2] De Exclusione Ovulorum in Salacibus absque ullo prægresso Coitu, 1717.

1758, all of whose writings, as well as those of Buffon, which appeared near the end of this period, contain on this subject little more than an exposition of the ovarian systems of Kerckringius and Malpighi, and, in what relates to the discovery of corpora lutea in the virgin female, at least, have become familiar to us by the references of modern writers.

Contemporaneously with these were Littre, who,[1] as has with equal truth been asserted of menstruation[2] in the present day, declared that the number of scars in the ovaries was the precise counterpart of the previous fecundations; and succeeding to them was Roederer, who was the first, by a representation of the virgin ovary, to demonstrate that such cicatrices are often found in profusion indenting the ovaries of women who have never been pregnant;[3] and who, also,[4] records an example of a corpus luteum in a woman of whom it could not be supposed that she had borne a child. Following this judicious and accurate observer, was the illustrious Haller, who, denying the possibility of conception happening without a corpus luteum, and defying the universe to present an example of such a body in a virgin, homologated the whole principle contended for by De Graaf regarding the fecundative character of the emission of ova, and the essential connection between this and the formation of corpora lutea;—urging his views with a vehemence and a pertinacity, which have latterly been seen to have been ill bestowed, but which went far at the time to secure for them a general reception, and, subsequently, to exert a most baleful disturbing influence on the investigations of succeeding anatomists.

On this principle is to be explained the attempt made in 1788, by Blumenbach,[5] to reconcile the existence of known facts with Haller's views, by resuscitating, on very erroneous data, an opinion which had been previously insisted on in a different manner by Kerckringius, and under the same aspect by Drelincourt, that the Graafian vesicles might be ruptured not merely by fecundation, but also by the essential or independent force of the ovaries when in a state of orgasm. To him succeeded the Hunters and Denman, whose opinions on the points in question were substantially those of De Graaf; and in 1797 appeared Dr. Haighton's Inquiry,[1] in which the assumption of the generative origin of corpora lutea on which it proceeds, distorts the results deduced from every experiment; and in the same year,[2] Mr. Cruikshanks, in a series of observations made under the auspices of Dr. William Hunter, for the express purpose of testing those of De Graaf, concludes the whole by asserting that the ovum is formed in the ovarium by conception, which also causes its discharge into the tube and uterus by means of the corpora luteum, literally after the manner first described by De Graaf.

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[1] Murat, in Dict. des Sciences Méd. t. 39, p. 1.

[2] Mr. Girdwood, in Paget's Analysis, 1842-3. Mr. William Jones, M. Negrier.

[3] Icones, p. 38.

[4] Ibid. p. 43.

[5] Comment. Gottingen. vol. ix. p. 109.

The principal writers who have followed in the same direction to the present day are Burns,[3] Meckel,[4] Power,[5] Blundell,[6] Seymour,[7] Montgomery,[8] Barry,[9] Carpenter,[10] Lee,[11] Ramsbotham,[12] all accepting unreservedly the theory of the evolution of ova from the ovaries by impregnation, but also admitting after Blumenbach that they are sometimes discharged under the influence on the ovary of other causes.

IX. *Evolution of Ova from Ovaries, in Connection with the Rut in Quadrupeds, and with Menstruation in Women.*—The opinions of one class of physiologists adhering to the doctrine of the extrusion of ova by impregnation alone—modified, latterly, by the admission that the ovarian structures which indicated the separation of ova might be found in virgins, but attaching to that fact an erroneous exposition; and the views of another class, who insisted still more strongly on the influence of the same presumed cause, and, also, on others equally unconnected with pregnancy—as the menses, in accomplishing the discharge of ova, have been traced, already, as low as the end of last century.

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[1] Ph. Trans. vol. 87, p. 159.

[2] Ibid.

[3] The Anatomy of the Gravid Uterus, 1799, p. 80. Principles of Midwifery, 1840.

[4] Meckel, Anatomie Descript. p. 735.

[5] Essai, 1821, p. 24.

[6] Researches Physiological, &c. 1824.

[7] Illustrations of some of the principal diseases of the Ovaria, &c. 1830.

[8] Signs and symptoms of Pregnancy, 1837.

[9] Phil. Trans. vols. 128, 129, 130.

[10] Physiology, 1845.

[11] Cyclop. Pract. Med. vol. iii. 1833. Lectures in Med. Gazette, 1842. Theory and Pract. of Midwifery, 1844.

[12] Ramsbotham's Midwifery, 1844.

It has, although incorrectly, been said that Cruikshanks, who wrote [1] in 1798, asserted the fact of ova being emitted by non-gravid women during the flow of the menses; the reference by that writer, taken in connection with the other statements of his paper, being only to a presumed washing away of an impregnated ovum by the menstrual blood; but in 1762, more than twenty years after publishing his views of the formation of the ovum within the Graafian vesicle, already quoted, the illustrious Morgagni [2] relates the dissection of an unimpregnated young woman, who died during the flow of the catamenia, in one of whose ovaries he noticed an opening leading into an empty vesicle of some size; and in 1790, Brugnoni [3] repeats an observation of the same kind, and also states that he had detected yellow bodies in the ovaries of mules.

The latter writer adopted generally the views of previous followers of Malpighi, and especially that of the supposed function of the bodies called corpora lutea to secrete ova; an opinion which Morgagni,[4] however, rejected, asserting that what these 'graves auctores' called ova were only an effect of disease; and in 1817, Sir Everard Home revived the speculation so objected to, in a paper,[5] which is as remarkable for its profound obliviousness of everything advanced in the same direction by the Italian physiologists who went before him, as it is for being apparently the unacknowledged source of many of the speculations on this subject which have succeeded it.

Sir Everard announces it as a discovery he had made, that the corpus luteum is a body in which the ovum is found antecedent to impregnation, and he states his conviction that one or more ova pass from the ovarium to the uterus every time a female quadruped is in heat, whether she receives the male or not; that corpora lutea are formed in the ovaries and ova, are discharged into the uteri of virgin women, and that impregnation may take place in the tubes; that menstruation in women and monkeys is an identical physiological condition with the rut in other animals, the distinguishing feature of a sanguineous discharge in the former being only an accident which is occasioned, should the state not be associated with impregnation, by the more compact structure of their uteri, and having for its object the relief of the congestion of the parts, and their restoration to their natural tone.

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[1] Phil. Trans. vol. 87, pp. 201-211.

[2] De Causis et Sedibus Morbor. Epist. lii. art. 28, 1762. Adver. sur Anat. iv. 28, 17.

[3] Brugnoni de Ovar. eorumq. Corp. Lut. Obs. Anat. in Mem. Taurinæ, 1790. La Médicine éclairée par les Scien. Physiq. par Fourcroy, i. ii. p. 141.

[4] De Causis, &c. epist. xlvi. art. 30.

[5] On the passage of the Ovum to the Uterus in Women. Phil. Trans. vol. 107, p. 252.

From the confident way in which Sir Everard refers to the subject[1] in a subsequent paper, some of his views would appear to have received a measure of acceptance when, in 1820, Dr. Power published his essay on the Female Economy.

In these the writer assumes substantially, although not in terms, the homogeneity of the physiology of menstruation with the rut of animals, and states it as the leading feature of his theory, that the discharge of menstruation is an accident which is contingent on non-impregnation. He supposed that the generative powers of the human female occasioned the formation of the human ova (Graafian vesicles ?) by an orgasm of the ovary which arrived at its acme every lunar month, and that simultaneously with this there was set up a uterine nisus, which, on the impregnation of an ovum, terminated in the secretion of a decidua, but which, in the event of non-fecundation, gave rise to the menses. He expands a principle long before put interrogatively by Drelincourt,[2] of the turgescence of a matured ovum (Graafian vesicle ?) at the sexual period, which on being vivified by the semen masculinum, as is, in animals in a state of nature, the rule, produces at once a solution in the continuity of the peritoneum over the ovum (Graafian vesicle ?), permitting the descent of this into the uterus, and a plastic effort in the uterus, giving origin to a decidua; but which, should its impregnation not occur, which in civilised life is the rule, is then either absorbed, or, under strong sexual orgasm, is extruded, forming a corpus luteum, the uterine nisus in the meanwhile degenerating, as had before been said by Raynold,[3] and others, into menstruation, which latter was therefore to be regarded, homologating in this the mendacious figment of Roussel, as a mere product of civilisation.

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[1] Phil. Trans. vol. 109, p. 234, 1819.

[2] De Sem. Mul. p. 20.

[3] Birth of Mankind, 1626, p. 49.

It has been much disputed whether Dr. Power was the first to propose the oviparous or vesicular theory of menstruation, and the writer has said that the germinal principle of this hypothesis is to be found much earlier. Drelincourt's words are: 'An ova vel periodicè, vel erraticè non turgescant, suoque commoto fermento venerem non stimulent?'

Van Oovercamp quoted by Verheyen,[1] appears to have asserted soon afterwards, that the menses are excited by a ferment which lodges in the ovary; and Dr. Gregory,[2] following Cullen,[3] embodied a similar opinion prior to the papers whether of Dr. Power or of Sir E. Home; while,[4] as appears from the report of Professor Frank, of Wilna, it was an idea which was entertained in this country about the time that Gregory wrote, that in menstruation the ovaries are in a turgid and plethoric state. Dr. Gregory's words are—Verisimile quoque est ovaria ipsa humores quosdam fœcundos secernere, qui demum per suum stimulum uterum, partesque vicinas, plurimum afficiant, sanguinemque imprimis in ipsarum arterias invitent. . . . . . Sæpius vero, salva omnino organorum fabrica, menses solita ætate non prorumpunt, ob defectu istius conditionis ovariorum, unde secretio humorum fœcundorum qui utero stimulo videntur esse pendet.

Dr. Power asserts,[5] that he was in the habit of constantly communicating his theory to the students who attended his lectures in London for about ten years after the date of his book; and in 1827, Dr. Bostock,[6] who does not appear to have been acquainted with Dr. Power's opinions, reviewing the accumulating evidence for the occasional discharge of ova independently of impregnation which was supplied by other writers who preceded himself, advances the remarkable suggestions, that the spontaneous disposition of ova by the female, instead of being an incidental occurrence, is the uniform mode of their separation; the evolution of vesicles from the ovary, and the production of corpora lutea, being essentially dependent on the female organism, and that the seat of impregnation, when it happens, is in the tubes.

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[1] Supplement. Anatomicum, 1710, cap. 16.

[2] Conspect. Medicinæ, 1813, cap. xxi. 771 and 815.

[3] First Lines, p. 100, quoted by Dr. Power.

[4] Ed. Med. and Surg. Journal, vol. iii. p. 33.

[5] Lond. Med. Gaz. 1843-4.

[6] Physiology, vol. iii. p. 38.

The same year was distinguished by the discovery by Dr. Charles E. De Baer, Professor of Zoology at the University of Königsberg, of the true ovum in the Graafian vesicles of unimpregnated mammals, an account of which was addressed by him to the Imperial Academy of Sciences at St. Petersburg, and published afterwards at Leipsic, followed, in 1828, by a Commentary by himself in German, and, in 1829, by a French translation and Commentary by M. Breschet. Prior to this event, and, by many in other respects correct writers, for some years after it, the terms ova and vesicles were applied to the same objects, and such was the repute in which the doctrine of ovarian conception, and the notion of the necessity of this to the rupture of the vesicles, and the discharge of ova, were held, that it was not till after eight or ten years that the value of Professor Baer's discovery began to be felt, or till a later period still that its importance in relation to the present enquiry was duly appreciated.

In 1831, as appears from a certificate in the preface of a work [1] published in 1840, M. Negrier, a lecturer on midwifery at Angers, communicated it to the Society of Medicine of that city as a conclusion to which he had been led by an examination of the structure and functions of the ovary in other classes of animals, that the cause of menstruation and its periodicity is to be sought for in that gland. This, which is nothing more than the echo of Home and Power's statements, with the former of which Dr. Negrier was familiar, is the amount of what appears to have been known by him at that date, and to have had no other basis for its support than general reasonings on certain phenomena presented by the lower animals.

In 1833, Dr. Lee, in the article Ovary, in the Cyclopædia of Practical Medicine, after referring to certain cases of congenital and of artificial deprivation of the ovaries in which menstruation was arrested, and to others in which the ovaries were present but the uterus wanting, in which a menstrual nisus was periodically experienced, as evidence that the ovary and not the uterus is the cause of the catamenia, relates four dissections which he had made subsequent to 1831 of women dying during the flow of the menses, in all of whom he had discovered a recent opening in the peritoneal coat of the ovary. Dr. Lee, when preparing this paper, had no definite idea of what it was which made its escape by the openings in the ovaries, but supposed it probable that all the phenomena of menstruation depend upon, or are connected with, some peculiar changes in the Graafian vesicles, by which an opening is formed in their peritoneal and proper coats, which allow the escape either of the entire Graafian follicle, or of the fluid which it contains. Before the appearance of his paper, the scars of recent openings in the virgin ovaries had been long[1] familiar to physiologists, and repeated examples in unimpregnated women of the openings even unhealed and patent[2] had been recorded; the suggestion of the turgescence of a Graafian vesicle as the cause of rut, and the fact of certain of these being evacuated and corpora lutea formed, exactly as in the pregnant female, in quadrupeds during that season, and under strong sexual excitement without connection with the male,[3] was well known; and an hypothesis[4] assigning a similar orgasm of the human ovary as the occasional cause of the rupture of its follicles, and of the formation of corpora lutea, was in general repute; the identity of menstruation in its nature with the period of the rut, had been much insisted on,[5] the existence in the ovary of a material,[6] and the secretion by it of a humour[7] which give occasion to the menstrual discharge had been mooted; the indirect connection of the monthly maturation of an ovarian vesicle with the menses, and the possible association of this latter, should venereal orgasm occur, with the rupture of a fully-developed vesicle, and the consequent production of a corpus luteum, had been stated; and lastly, Dr. Bostock[9] had broadly announced that the evolution of ova, and the formation of corpora lutea, were uniformly accomplished in entire independence of the male, by the essential power of the female organism alone; but Dr. Lee was the first to connect and illustrate the rupture and discharge of the Graafian vesicles, occurring, as he supposed, coexistently with, and perhaps dependent on, menstruation, by a series of dissections.

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[1] Recherches sur les Ovaries. Paris.

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[1] Vide De Graaf, Roederer, Morgagni de Causis, &c. ep. 52, art. 28.

[2] Brugnoni, quoted by Raciborski, op. cit. p. 407; Velpeau, Traité des Accouch. tom. i. p. 149; Vallisnieri in Dog. Hist. della Generaz. par. ii. cap. 3.

[3] Drelincourt, Home, Blundell, Bostock. [4] Blumenbach, l. c. [5] Le Cat. Roussel.

[6] Van Oovercamp, op. cit. [7] Dr. Gregory, loc. cit. [8] Power. [9] Loc. cit.

In 1838-9, M. Gendrin in France, and Mr. William Jones in this country, gave a kind of completion to the vesicular hypothesis of menstruation, by asserting that there was not only a probable coexistence between those lesions of the ovary and menstruation, but that this process is no more than the periodical phenomenon of a function, which consists in the monthly development and escape of a matured ovum, from one of the ovaries. M. Gendrin's[1] exposition professes to be based on five dissections, similar to those of Dr. Lee, some of which he says had been made as early as 1828, and the whole is produced in a form of minute and definite arrangement, and of apparently correct and precise description, which is very imposing.

Mr. Jones[2] also founds his statements, although more vaguely, on the authority of dissections, in one of which, made fourteen months before in a virgin, he had seen the ovum (Graafian vesicle?) grasped by the tube; and he hazards a lengthened history of the monthly ascension of one of these from its bed within the ovary, and of the commotion excited by it as it moves along the tube, only quieted by the eruption of the catamenia which occurs on its descent into the uterus, which is strangely in contrast with the dimensions of a human ovum taken in connection with the mechanico-vital principles on which the hypothesis is constructed.

In the same year Dr. Lee published an excellent paper[3] on one of the forms of corpora lutea; and in some remarks made by him afterwards[4] on this, he adds the additional fact, that modifications of these bodies are sometimes produced by menstruation; and in 1840, Dr. Paterson, in an essay on the same subject,[5] repeats this statement in connection with three dissections of such supposed menstrual bodies in the ovaries, and with numerous others, in which he believed, adopting the common opinion, the appearances to have been occasioned by impregnation. Immediately afterwards, M. Negrier published his researches, in which, assuming the speculations of Malpighi, Home, and Plaage, relative to the corpus luteum, as a basis for his own, he maintains that at every monthly period one of these bodies assumes a high degree of activity, becomes distended with fluid and the centre of a congestion which extends throughout the ovary, corresponding tube, and the uterus, giving rise to the catamenial discharge, and more or less constitutional and local sufferings, which are terminated at length by the bursting of the thick wall of the yellow cyst, and the ejection of the ovum.

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[1] Traité Philosoph. de Méd. Pratique.

[2] Practical Obs. on Diseases of Women, by William Jones. London, 1839.

[3] Med. Chir. Trans. vol. xxii.

[4] Lancet, 1838-9, p. 508.

[5] Ed. Med. and Surg. Journ. vol. liii. p. 49.

At this time, also, M. Duvernoy, of the Academy of Sciences of France, reasoning on the observation of what are termed corpora lutea in virgin women, and on the analogy in the composition and development of ova in birds, reasserted the spontaneous periodical discharge of these in the mammifera irrespective of fecundation; and in 1842, M. Pouchet, who had been in the practice of repeating the same opinions in lectures at Rouen, from 1835, published his 'Théorie Positive,' the main feature of which is, that the ovum in the whole animal series is invariably produced in connection with the rut, and evacuated independently of impregnation;—a periodical and spontaneous evolution being the universal law of the animal kingdom, to which man does not form an exception.

In the same year Dr. Lee published his Lectures, in which, besides adding two dissections to those he had already given, he repeats in more definite terms his previous opinion that at each period of menstruation a Graafian vesicle bursts and its contents escape; and the notion that this evolution was to be regarded as at length revealing the true and long-sought for cause of menstruation, being now somewhat generally entertained, the merit of its discovery began, in 1843, to be claimed not only for the latter writer, who had never, however, committed himself to any articulate explanation of the matter, and for Dr. Power, some of whose statements admit of such an accommodation although contradicted by the more specific announcements of his views, and for Messrs. Gendrin and the other writers to whom reference has been made already; but also for MM. Cuvier, Duges, and Raciborski in France, M. Nægelé the elder, and M. Bischoff, in Germany, while in Italy, Professor Argenti of Padua followed[1] in the same track, and in England the right of priority was claimed for Dr. Laycock[2] and Mr. Girdwood,[3] the latter of whom produced evidence of his having been accustomed to observe and record the proofs of this monthly deposition of an egg by the human female, for so long a period as from 1831.

The writer of these contributions deems it beyond his province to obtrude his judgment on any question of personal claims, his desire being rather to confine himself to the detail of facts in connection with their relative history as matters of science; but if there be any whose labours in this field have had more successful and definite results than those of others, it is MM. Raciborski and Bischoff, in their simultaneous discovery, in 1843, of ova in the tubes of virgin animals at the time of rut.

It will be remembered[4] that, at the period when Kerckring wrote, physiologists, from a comparison of his statements concerning the ova of mammals with what was known of the sexual functions of other orders of animals and of plants, had inferred the conclusion that unimpregnated ova pass along the tubes of virgin animals, to be fecundated in the uterus, or to be discharged as sterile; and the announcement of any one that he had really detected these in autopsies of such animals, would have been as german to the state of previous expectation nearly as at the present day; but unfortunately for science, and for multitudes of suffering quadrupeds sacrificed in a mistaken line of investigation, this conclusion did not happen to have been verified by actual dissection, and was soon jostled out of sight by the experiments of De Graaf on animals which had had connection with the male. The various misconceptions to which this mode of enquiry gave rise, and the rooted hold obtained for these by means of the authority of the venerable and illustrious

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[1] Annali Univ. de Med. Milan. t. cv. p. 311.

[2] Lancet, 1842-3, vol. i. p. 714.

[3] Lancet, 1842-3, vol. i. p. 825.

[4] Sect. VIII.

Haller, have been noticed,[1] and the slow progress of the truth of the case in another line, and mingled with errors of another description communicated to it by Malpighi and his followers, has been, in the present section, traced in a recently enlarging and depurating stream to our own day; but the fact which mainly distinguishes the researches of physiologists in this department in the two centuries nearly which they have occupied, is, that from the declaration of Kerckring's[2] reviewers, till the time of MM. Raciborski and Bischoff, no dissection having in view the discovery of ova in the tubes of virgin animals was ever made. These investigators, guided by accumulating and advancing facts, and by general reasonings instituted on these by other enquirers, at length thought of this expedient, and were abundantly rewarded in the satisfactory demonstration of ova[3] in the tubes of bitches, of swine, and, by M. Bischoff, in a lamb, all of which animals had passed through the season of rut insulated from the male. The latter physiologist also relates four dissections of virgin women, and the other two, and refers to more, who died at or near the menstrual period, in the ovaries of which appearances similar to those observed in the quadrupeds they examined at the time of rut were detected, from which they educe, like many before them, a correspondence of physiological nature, and of anatomical results, in the two conditions; but the positive demonstration of the presence of ova in the tubes or uteri of virgin women, although such an excretion indubitably takes place, and that also, if the woman be menstruating, most commonly during the first fourteen days which succeed menstruation, has never yet been actually made by any observer. The statement of Malpighi,[4] that he had discovered a very small ovum in the tube of a woman; and that of Dr. Burns,[5] that he had seen a vesicle in the same situation, which contained a turbid serum like what is found in the young ovum of the bitch, are neither of them conclusive in regard to the bodies they saw being unimpregnated ova; and the assertion of Mr. William Jones,[1] as well as those of some other authors, that they had seen human ova within the fimbriated end of the tube, were made, the writer believes, from those observers mistaking Graafian vesicles for ova; and they are the only observations with which the writer is acquainted, which bear on the present point.

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[1] Sect. VIII.

[2] Phil. Trans. vol. vii.

[3] De la Ponte Périodique chez les Femmes et les Mammifères, par M. A. Raciborski, p. 376. 'The periodical maturation and extrusion of ova, independently of coitus, in mammalia and man, proved to be the primary condition to their propagation. By Th. L. W. Bischoff.' Translated in the London Medical Gazette for January and February 1845, by Mr. Henry Smith.

[4] Letter to Oldenburg.

[5] Anat. of Gravid Uterus, p. 110.

In the latter end of 1843, the series of observations on the ovary, made by the writer, from 1839, in the course of his other microscopical investigations as one of the physicians of a large hospital, began to be published,[2] in which he showed, that instead of the elimination of ova being limited to menstruating women, it is maintained, often in great activity, in all females, and at every period of life; that the full development of the ova and of the Graafian vesicles which contain them, has a correspondence with a state of organic or vital activity, which is not necessarily, but is in general, associated with menstruation; that the rupture of the ovarian vesicles during menstrual life, although frequently failing to occur on the flow of the catamenia, and often taking place on different days of the interval of the menses, is probably much facilitated by the increased vital activity of the ovaries which obtains at menstruation; and that the two weeks which follow the fulfilment of this function, when the uterine cavity is generally lined with deciduous villi, is perhaps the most common period of the discharge of ova, as it certainly is of conception.

X. *Theory of Menstruation.*—The reasoning of many at present on the connection of menstruation with the emission of the contents of the ovarian follicles, resembles that employed formerly on the relation of impregnation to what are termed corpora lutea; for, as then, the *post hoc propter hoc* argument was universally proceeded in by De Graaf and his followers, the corpora lutea discovered in the ovaries of animals after fecundation being regarded as the necessary results and indubitable proofs of that event, to the exclusion of the rut which went before; so now, because this latter condition in animals is always, and the process of menstruation in women is usually, succeeded by the rupture of some of the vesicles of the ovaries, these states are often considered as being undoubted consequences of the periodical extrusion of ova, to the shutting out of view of the independent vital powers of the ovaries, existing antecedently to both, and of which they are merely correlative effects.

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[1] Op. cit.

[2] Medical Gazette, 1843-4.

It might be shown that the hypothesis now referred to has no support in the facts even which have been supposed to demonstrate its truth, but in effecting this, it would be needful to institute a minute investigation of published cases as invidious as it would be tedious, and which negative evidence, besides, is happily unnecessary, possessed as we are of the knowledge that the ovaries are[1] sometimes filled with mature vesicles, and that ova are being constantly extruded in every form of amenorrhœa, and during the normal absence of menstruation, and, also, that this latter function is[2] often accomplished without the rupture of an ovarian follicle, and sometimes even,[3] for a limited period at least, when one or both tubes are impervious.

The effect of the[4] congenital absence of the ovaries, or[5] of their artificial removal, in preventing or destroying menstruation — the fact, that symptoms of an ovarian nisus without hæmorrhage[6] have been remarked in women born without a uterus, but possessed of well-developed ovaries, and, again, the establishment sometimes of a periodical vaginal hæmorrhage[1] in cases of extirpated uterus; and, on the other hand, the correspondence which is[2] often observed between the increased development of the pilous tissue subsequent to the natural or abnormal cessation of the menses, and those changes[3] in the analogous structure which occur in young birds on the excision or destruction by disease of the ovaries, all appear to be so many good grounds for believing that the ovaries are, in some way or other, essential to menstruation.

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[1] —— ——, a robust girl of 16, with a well-formed circular hymen, but who had never menstruated, died on the sixth day of typhus, with softening of heart and large effusion into pericardium, but no adhesions. Ovaria covered with several mahogany-coloured points, in one of which was a capillary-sized foramen, which led into a Graafian vesicle of about the bulk of a small grape, in which was a little blood. After some hours' immersion in a solution of nitre, the peritoneal coat of the ovaries was seen to be slightly abraded in the situation of the remaining discoloured points; on cutting into which a highly injected, turgid, and diaphanous vesicle, generally of the size of a pea, was brought into view under each spot, and numerous other follicles, some equally large and others smaller, were observed in other situations under the stroma of the glands, but not having any stain or abrasion corresponding with them in the peritoneal coat. See also First Series of Contributions, *passim*.

[2] Second Series, *passim*.

[3] Idem, Part I. Sec. II. 8. De la Menstruation, par Brierre de Boismont in Mém. de l'Acad. Roy. de Méd. tome neuvième. Ed. Med. and Surg. Journ. vol. liii. pp. 60, 61. Lancet, for March 1, 1845.

[4] Lectures on Midwifery, by Gooch, Chap. I. Sec. 5. Lectures on Midwifery by Lee, p. 40.

[5] Pott's Surgery.

[6] Elliotson, in Encyclop. of Pract. Med. vol. iii. p. 226.

The periodical turgescence and enlargement of these bodies before and during the flow of the menses, which may often be seen in women with irritable ovaries, and in cases of ovaritis, and of the different forms of encysted disease, and of suppuration of these glands; the monthly anasarca of the lower limbs, a consequence apparently of venous congestion, which is often found to accompany menstruation; and the remarkable engorgement of the ovaries, which is ascertained uniformly to precede and attend the catamenia in a case of tumor of the uterus, with healthy ovaries, which is known to the writer; together with the increase in volume—also observed[4] to have been undergone by the sound ovary in an inguinal ovarian hernia, at every flow of the menses, and the almost total disappearance of the gland on any occasion when the menses were abundant; united with the fact, that, in certain cases of amenorrhœa from disease of the ovaries, the menstrual discharge is sometimes restored immediately on the increase of the capillary circulation of the enlarged ovaries, which is induced by a course of mercury, are, again, each of them, circumstances which indicate that before and during menstruation the ovaries are the seat of an increased vital activity and phlogosis.

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[1] Dict. des Sc. Med. tom. xxxi. p. 219. Platu, Obs. Libri. tres, 1613, p. 718, Baxter, Ann. de Liter. Méd. Étrang, à Gand, t. xv. p. 346. Langenbech de totius uteri extirpatione Gollin. 1842, p. 3, note 2: quoted by Chereau, Mal. des Ovaries, p. 49. Bischoff, in Med. Gaz. Jan. 3, 1845, pp. 448-9.

[2] Burlen de Fœminis ex Suppressione Mensium barbatis, quoted by Chereau. Hippoc. Sec. vii. lib. vi. pp. 297, 55, and 301, E. F.

[3] Yarrel, in Memoirs of Linnæan Society, quoted by Seymour.

[4] Verdier, Traité des Hernies, 1840, p. 394.

The facts already recited[1] of the presence of menstruation for successive periods without the evolution of an ovum, and that mature ova, on the contrary, are often extruded without menstruation, forbid the supposition, either that this monthly congestion of the ovaries is caused by the descent of an ovum into the tubes, or that the latter event, although the usual, is therefore the invariable, or always even, in relation to time, the immediate effect of the former state. In quadrupeds, again, the bursting of the ovarian vesicle does not take place for four, five, or more days after the commencement of rut, and impregnation in the human female, as every accoucheur knows, does not occur earlier, in a majority of the cases, than a fortnight subsequent to the disappearance of the menses, while in[2] multiplied examples it happens indifferently on every day of the monthly interval; the menstrual vessels lining the uterus, also, remain generally as long as from ten to fourteen days[3] after the discharge has ceased—thus indicating that their function of affording a nutrient nidus to the ovum may not be accomplished even at that late period: while the cases which have been adduced by different authors, of ovaria presenting a hole in their coats instantly on menstruation, are often, in reality, specimens only of Graafian vesicles, which have been discharged antecedently to the last catamenia, such openings being[4] frequently persistent for three months after their occurrence, and the granular matter of the corpora menstrualia remaining vascular and succulent sometimes for a much longer interval.

It seems greatly more in accordance, therefore, with the natural and obvious interpretation of what is known on this subject, instead of attributing the monthly augmentation of energy and circulation obtained by the ovaries, to a mechanical cause, such as the irritation, whether of a ripe vesicle or of a corpus luteum, to regard it as the result of a strictly independent or primary vital power, possessed by the ovaries themselves as individual organs, or, in other words, as the fruit of their own proper functional action.

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[1] First Series, *passim*. Second Series, Sect. ix.

[2] Merriman's Synopsis: Introduction. Dr. Murphy's Tables, in Dublin Medical Journal.

[3] First Series, *passim*.

[4] First Series, *passim*.

A very common form of amenorrhœa in large towns happens in healthy young women immediately on their arrival from the country. In these the suddenness of the affection during robust health, forbids the notion that it can arise from a want of mature ova within the ovaries; and, when taken connectedly with the improvement of such cases, and of those of the chlorosis of cities, on their removal to a pure and dry air, it would suggest, rather, that the true cause is to be found in a sudden depression of the general and local vital powers of the system, the effect of a deteriorated atmosphere. The permanent extinction of menstruation, again, which the writer has seen effected all at once by depressing moral causes, in a female under thirty, parallel instances of which must occur to most readers, seems referrible to a similar lesion of the general powers, and not to destruction of the ova, as these, although in an immaturated state, continue to be largely secreted in every form of amenorrhœa from disease, often in ovarian cells of medium size, and well-organised and vascular coats; while in the amenorrhœa of gravidity and lactation such vesicles are frequently so matured, that about thirty-three per cent. of all lactating women become pregnant in that condition, and the writer has known repeated examples of females becoming pregnant within from four to eight weeks after their deliveries at the full term. Nor can it be said that in the cases of morbid absence of the catamenia referred to, the nervous lesion suspended menstruation, rather by arresting the development of the Graafian vesicles, than by lessening the organic power of the ovaries, for, in the examples of congenital absence of the uterus, attended with a regular menstrual effort, which are recorded, it is certain, that, owing to the physical necessity for their discharge into the cavity of the abdomen, which obtained in these cases, the vesicles of the ovary must have consisted only of fragile structureless cells of the most minute size, and totally incompetent to the production of the periodical nisus which is yet declared to have existed.

In addition to these considerations it appears inexplicable, on the principle simply of a distinction of species, that while the escape of one, or at most two ova, should, as is alleged, kindle up such an amount of vascular excitement in women as to give rise to a sometimes profuse sanguineous discharge, which continues from three to seven days, the rupture of a dozen of vesicles at each ovulation of many of the inferior animals should not be attended with the same effect.

The fact, again, that, although the ovaries may be full of mature ova without the superinduction of the menses, that this profluvium is never habitually performed without the coexistence of fully developed vesicles; and also, that menstruation, when permanent, is always accompanied by linear or crucial lesions of the ovaries, indicative of increased powers of absorption in these glands conjointly with that condition, and of additional facilities being thus afforded for the rupture of the dense structures of the fully organised follicles of the menstruating woman by menstruation itself, would fully warrant the supposition that the menstrual orgasm is rather a cause of the maturation and discharge of the Graafian vesicles, than an effect.

Taking into view, therefore, these various elements, it would appear that the arguments in favour of the bursting of a Graafian follicle as the cause of menstruation, proceed on the fallacy of mistaking an accompanying phenomenon, and in some sense an effect, for the cause; and, without attempting any explanation of the fact itself, but esteeming it as, in the present state of our knowledge, a strictly ultimate one, the writer presumes that menstruation and the elimination of ova are equally functional phenomena of the ovaries, dependent on their specific vital action as glands;—this action in the healthy non-gravid and non-lactating woman sustaining a periodical exaltation of power which extends to the nervous, vascular, and absorbing tissues of the ovaries, occasioning the maturation and discharge of their vesicles, and to the uterus, and vagina, giving rise to the extrusion of deciduous vessels and to the menses.

It is no objection to this view that uterine hæmorrhagic discharge sometimes occurs in circumstances which appear to preclude the pre-existence of any functional effort of the ovaries, and that such discharge often possesses all the ordinary properties of pure blood, so that sometimes, on dissection, the blood is even seen to proceed from the open mouths of the uterine veins, and not from arterial villi. Thus the menses, as has been imagined, sometimes return unexpectedly at other than the normal periods; as in nervous females, when the circulation of the right side of the heart has been temporarily impeded by sudden fear, or that of the abdominal cava by tight lacing or other obstruction; or they appear, as is believed, in states of disease in which they could not have been anticipated, as in permanent hindrances to the pulmonary circulation attended with dilatation of the right heart; or in destruction of the healthy structure of the ovaries by diseases accompanied with great morbid enlargement; but in all such cases the excretion from the uterus must be regarded rather as pathological than as catamenial, and the effect of an abnormal regurgitation of the blood in the open uterine veins, than as that of the healthy functions of the ovaria. The frequent intermixture of both arterial and venous blood with the ordinary menstrual excretion, again, which may be asserted to happen in women with profuse menstruation, is easily explicable on the principle, in the one case, of the operation of an unnatural intensity of the proper catamenial orgasm, and in the other, on that of a disordered irritability of the muscular fibre of the uterus, retarding the return of blood in its veins.

XI. *Corpora Menstrualia vel Periodica.*—Although repudiating the notion that the expulsion of mature ova from the ovaries is the efficient cause of menstruation, the writer is yet persuaded, that the vascular orgasm of the sexual organs in which the menstrual condition and the corresponding state in quadrupeds consists, is the true and exclusive source of corpora lutea. The presence of the catamenia is, indeed, no indispensable prerequisite to the rupture of a Graafian vesicle, but, in the opinion of the writer, it certainly is to the formation of an organised corpus luteum; and, holding this view, he would humbly suggest that corpora menstrualia, or periodica, are more appropriate and eligible generic names for these bodies, than that which is in common use; while, as respects their various modifications, he would still take the liberty of designating them according to their specific physical characters, such as corpora albida, corpora cephaloidea, &c., on the principles stated at length in the former series of these contributions.

In the human subject the really organised forms of corpora periodica are found only as accompaniments of menstruation, and their varieties are produced, in the opinion of the writer, by causes which operate on the tissues of the follicles, mainly, although not exclusively, after their rupture.

Von Bäer, in his fourth figure,[1] represents a perpendicular section of the Graafian vesicle in a female supposed to have been impregnated the day before she drowned herself, and which was not ruptured. It was very turgid, and on cutting through it he found the internal membrane separated from the external, thickened, somewhat congested condition; and on the faith of these appearances, confirmed by his observations on animals, he adduces such changes as distinctive marks of impregnation, and as the result of an hypertrophy of the inner coat of the vesicle which occasions its subsequent rupture.

Wagner[2] says that forty-eight hours after coitus in a dog, he found the unruptured ovarian follicle much distended, and the cells of the granular membrane converted into thick oval cells full of transparent molecules; and following the ordinary notion of the essential gravid character of these formations, he infers that the changes mentioned were the beginnings of the corpus luteum, appearing before the discharge of the ovum.

Bischoff[3] met with a parallel example in a dog which had not had the male, and, while he adopts the opinion of Wagner, that the corpus luteum is produced by the evolution of the cells of the granular layer, he concludes that this occurs at the time of rut, and independently of coition, as soon as the ovum has come to its maturity.

The writer has[4] often seen the swollen, puffy condition of the inner layer, now referred to, in the turgid unbroken vesicles of the human subject, and, also, frequently in such as had been discharged, in both cases without there being reason to suspect impregnation; and, on the contrary, dependent solely, as he presumes, on the vascular orgasm of the ovaries which precedes and accompanies menstruation. It is best observed in the larger and better organised vesicles, and suggests the idea of the projection of their lining membrane by the effusion under this of a transparent fluid at points where it does not adhere firmly to the external layer; and, in frequent instances, the adherent, or consolidated portions of the two membranes which separate these congested œdematous parts of the inner layer, and which appear as if they were empty blood-vessels, are found arranged as opaque lines, which, from their decussating each other in a regular manner, communicate to the internal surface of the vesicle a reticulated or a chess-board appearance.

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[1] British and Foreign Review, vol. i. Lettre sur la Formation de l'Œuf, p. 23.

[2] Quoted in Bischoff's Traité du Dévelop. p. 38.

[3] Traité du Développement, par T. L. G. Bischoff, in the Encyclopédie Anatomique, t. viii. p. 38.

[4] Contributions, *passim*.

In many of these cases there seems reason to believe that the phlogosis of the vesicle, which gave rise to this effusion, is limited in its further consequences to the induction of a state of opacity and thickening in its coats; or, in other words, to their conversion into the species of corpus menstruale which the writer has elsewhere called a 'white body;' but in others, the effusion is in larger quantity, and during the accompanying menstruation becomes organised as a yellow granular pulp, to which the septa which connect the two layers of the vesicle give a convoluted appearance, on account of which the writer has ventured to designate the bodies so formed as corpora cephaloidea.

Such, he apprehends, is, substantially at least, the rationale of the formations termed corpora lutea, in their primary or simple types. The two species to which he has referred—that constituted by the opaque and thickened membranes of the Graafian vesicle, the result of a kind of inflammatory action and of effusion in their structure—the corpora albida of these contributions; and that in which the effusion is larger in quantity, granular, supplied with vessels, and situated in a kind of crypt between the two layers of the follicle—the corpora cephaloidea, are, he believes, the only primary forms of corpora menstrualia which ever appear, and they are strictly confined to the child-bearing period of female life, and are never to be seen except in menstruating or recently menstruated women.

A woman may menstruate for a number of times consecutively, and no corpus menstruale be produced, but this will depend either on the fact that no vesicle has been ruptured during the period, or that, if any have given way, it has been at times too remote from the menstrual nisus to have permitted them to have been influenced by it. Or, again, in such a case as is here supposed, or in others before the establishment of the catamenia, or after their temporary or permanent cessation, the coats of a vesicle may be discovered, sometimes ruptured, at others intact, and either yellow or black, and with or without a corresponding deposit in their internal surface, but such bodies are mere blood marks, in process of decomposition, and neither possess vessels nor exhibit structural changes in the coats of the vesicle. Corpora menstrualia, on the contrary, constantly present the imprint of organic changes.

Venereal orgasm, although it appears sometimes to occasion hæmorrhage into the Graafian vesicles, and perhaps also occasionally to rupture their coats, is too transient to give rise to any changes of structure in the latter. The peritoneum covering a Graafian vesicle is gradually absorbed, previous to the bursting of the vesicle, and may sometimes in menstruating women be seen abraded to the extent of three-eighths of an inch in length by two-eighths in breadth, while the vesicle remains intact. In such a case various causes might be competent to rupture the vesicle which might yet stop short of affecting any permanent alteration in the thickness, &c. of its coats; and this, the writer apprehends, is the true theory of the ruptured follicles often met with which have no change on or deposit within their walls.

The occurrence of the ovarian orgasm which gives rise to menstruation, soon after such a rupture, or while the walls of the vesicle are yet vascular and distensible, may still issue in an effusion between their laminæ, or in structural changes of these, which will be more or less remarkable according to the nearness of the menstruation to the rupture, and proportioned to the persistency and intenseness of the catamenial excitation of the ovary;—circumstances which may probably supply the real explanation of the many instances of imperfectly formed corpora periodica which are met with both in the gravid and unimpregnated female. When a vesicle bursts after the menstrual nisus has quite subsided, there will be no granular deposit at all or any alteration effected in the layers of the vesicle; but when the rupture happens at a catamenial period, both the deposition and the changes in the coats of the follicle will be proportioned, everything else being alike, to the amount of exposure of the vesicle to the congestive action in the ovary.

When pregnancy is set up simultaneously, or immediately after the formation of one or more corpora menstrualia, the continuance of a vascular orgasm of the ovaries, which is maintained consequently on this condition, gives rise to certain modifications in the structure of the new bodies, which, as they are always superinduced on one or other of the species of those which have been here called primary—the corpora albida and corpora cephaloidea, and then constitute bodies which possess special properties, although they are, in reality, still varieties only of the primary species which have been named, the writer would describe as secondary transformations. They are the 'true corpora lutea' of authors, and, to the writer, they appear to be occasioned by the reflex influence of the congested and excited gravid uterus on the enlarged vessels, either intra or extra-parietal, of the recently-formed corpora menstrualia, than to have their point of departure from the uterus subsequent to the begun development of the fœtus; and not to be dependent, as has been supposed, on any peculiar and specific effect of impregnation as an act on the unruptured Graafian vesicles at the moment of conception.

In the species of primary menstrual body called cerebriform, the effects of utero-gestation are limited for the first two-thirds of the period to an exaltation generally of its organisation. The changes wrought on it are relative merely, and no differences of an absolute or positive kind can be perceived. The granular matter is larger in quantity, its vessels more distended, and its substance more pulpy and succulent, than happens in the average of such bodies in the unimpregnated female; and the external layer of the follicle itself is often increased in its thickness, but here the distinctions cease, till, during the concluding three months, the continued plethora of the vessels of the cyst gradually communicates a rose-coloured or reddish tint to its yellow granules, and eventually converts the brain-like body into a corpus rubrum.

Again, in regard to the other form of primary menstrual body, the corpus albidum, it is worth enquiring whether the secondary increased circulation of the ovary which unquestionably follows impregnation, distinct from that which obtains as a primary and independent state at menstruation, does not also explain the fact, that in many of the corpora menstrualia met with in pregnant women, the granular matter is found arranged around the opaque coats or cadaver of the ruptured vesicle, and among the vessels which formerly connected this with the stroma of the ovary, and not within its walls.

It is to be borne in mind that, in the formations now under notice, the nucleus of the granular matter is always a whitish double-layered membrane, destitute of blood-vessels, and identical with bodies—the dense and soft varieties of corpora albida[1] —which are found constantly in the ovaries of the menstruating virgin; and whether we regard the cartilaginous-like contexture of the expanded inner layer in some[2] of the granular structures in question, so destitute of vitality that it cannot be supposed the probable centre of the vascular action which would terminate in the deposition of organisable molecules around its exterior, and so little corrugated that its denseness and consequent cadaveric nature must have existed anteriorly to this deposition; or whether we take into account the flattened, contracted, stellated, or otherwise compressed condition of that other variety[3] of the same granular structures in which the yellow matter is exuded around a *soft*, but equally inorganic white body—there seems much reason to believe that the granular tissue in both varieties of this structure—the extra-mural cerebriform body—is a secondary formation or deposit, which is excreted by the ovarian vessels which are external to the corpus albidum, and which had formerly served to nourish its coats when it was a Graafian vesicle. The alterations of structure in the vesicle itself, by which it passes into the state of a white body, are, according to this view, the product of the increased activity of its own vessels under the ovarian orgasm of the menstrual period, and of such a nature as terminate, whether the woman be afterwards impregnated, or not, in the obliteration of these vessels; while the yellow molecules which lie exterior to the cadaveric vesicle in the bodies now under notice, are a transudation from its extra-mural vessels, produced by an augmentation of the blood in the ovaries, which, in the event of conception, occurs subsequently, and when the vessels which form a part of the walls of the vesicle are no longer patent, but those larger ones only which connect the exterior of the follicle with the stroma.

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[1] First Series, Summary, 16, A. B.

[2] Idem, 19, B.

[3] Idem, last paragraph.

Adopting these interpretations, the peculiarities of structure which are observed in the corpora periodica of pregnancy, and which are commonly believed to emanate from some unknown but immediate influence of the semen masculinum on the Graafian vesicles before their rupture, and are described, on this supposition, as constituting the essential features of true corpora lutea, are really occasioned subsequent to the discharge of the ova and the occurrence of fecundation, by the uterine excitement and consequent phlogosis of the ovaries to which gravidity gives rise.

The transition of the cephaloid bodies of menstruation into solid rose-coloured masses towards the end of pregnancy, distinguished as it is by being limited to that period of gestation when the uterine plethora is at its height, and by its gradual increase from its commencement, about the sixth and seventh months, till the accession of labour, when it rapidly disappears, is, indeed, conclusive on this point as it regards them; and in respect to the menstrual white bodies, and their conversion by pregnancy into extra-mural cerebriform, or granular bodies, the writer grounds his belief of the accuracy of his view on the known facts, that the nucleus of such cephaloid bodies of pregnancy is invariably a corpus albidum; that white bodies are the most common form of ovarian bodies in the unimpregnated female; that in her they have never been found having a granular deposit on their exterior; that they lose the permeability of their coats and become inorganic bodies at too early a period to consist with their being the centre of such an orgasm as could give rise to a granular deposit; and that, on the contrary, the size and number of the extra-mural vessels of the vesicle, immediately on its rupture at menstruation, are so considerable, and the ovarian phlogosis during pregnancy so great, that such an occurrence would be precisely what might *à priori* be anticipated; and it may be added, that while, in the intra-mural cerebriform bodies, the arrangement of the blood-vessels of the granular matter is strictly dendritic, or corresponding to that of the parietal vessels of the Graafian follicles, those of the extra-mural are more commonly arranged in lines which converge towards the inner rim of the granular matter, where it lies in contact with the remains of the follicle, now converted into a white body.

It may serve further to confirm the soundness of this rationale of what are called true corpora lutea, that the extra-mural cerebriform bodies of pregnancy, now described, undergo in common with the intra-mural cerebriform bodies of menstruation, when these obtain in the gravid female, a transformation into corpora rubra towards the end of utero-gestation. Their granular matter, as the latter third of pregnancy advances,[1] gradually becomes more vascular and dense, till they constitute red bodies; — a change which, assuming the accuracy of the explanation offered above of their original production, may perhaps entitle them to be arranged, on its accomplishment, as the tertiary formations of the ovary.

The writer, in closing this part of the argument, would mention it as an additional consideration in favour of the exposition which he has now taken the liberty of offering on the nature of the corpora periodica of pregnancy, that should two or more Graafian vesicles have been recently and simultaneously ruptured before fecundation, the series of changes which make up the concrete of what is called a true corpus luteum, will take place indifferently in them all.[2]

In treating of the corpora menstrualia in their primary forms, or as they are seen in the unimpregnated female, it was attempted to explain the varieties which are met with in the perfection of their development, on the principle of their formation having been commenced at earlier or later periods of the menstrual nisus. In reference to the same bodies when modified by a consecutive pregnancy, a similar principle seems equally just when employed to explain the different degrees of their development. For, whether such modifications be effected through the medium of the arteries of the vesicle sympathising with the increased vascular activity of the uterus, or through that of its veins kept permanently distended by the increased pressure of blood in the long and tortuous spermatic veins, it is reasonable to infer that they will be modified by the size, number, and vital activity of the blood-vessels of the vesicle at the period when they commence; or, in other words, by the relation between the date of the breach in the vesicle, and that of the menses or of the pregnancy.

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[1] First Series; Summary, 19. B. and P. ii. S. ii 5.

[2] First Series P. ii. S. i. 2, 6, 7, 8. S. ii. 4.

It is a question deserving future enquiry, whether, as was suggested in the former series, and as happens with the Graafian vesicle when its rupture has been too distant from menstruation to permit the vessels in its coats to be affected by that function, the vessels of a corpus menstruale, from a similar length in the interval between the formation of that body and impregnation, may not also be not partially only, but wholly impervious to the succeeding reflex orgasm of this condition, before it occur, and whether the state of pregnancy, therefore, may not, in some rare instances, exist, without being succeeded by its usual characteristic sequelæ in the ovaries.

It remains to be ascertained, also, whether any morbid orgasm of the uterus, such as might accompany several of its diseases of structure, would, were it set up immediately on the formation of a corpus menstruale, be reflected backward on the latter, and modify its organisation just as in pregnancy.

It is not, at least to the writer, any longer a matter of doubt, that when the ovarian granular body associated with a pregnancy is of the species named by him corpus cephaloideum, and of that variety of this which has the yellow matter deposited between the membranes of the vesicle, that there is nothing to prevent it being found in as perfect a type in an unimpregnated as in a gravid woman; and that also whether the uterus should happen to contain a tumor after its formation, or remain healthy. The proofs of the truth of this statement are to be met with throughout the writer's former series, and receive remarkable confirmation, in particular, from the specimen (First Series, P. II. S. I. 2), of a tubal conception, in the corresponding ovary of which were two intra-mural cerebriform bodies not differing from those of menstruation, and not differing from one another.

Such cases, therefore, may in the present enquiry be set aside, and attention directed only to the question, whether the conversion which the writer[1] describes as being effected about the seventh month of gestation of cephaloid into red bodies, and the variety of corpora cephaloidea in which the granular substance is arranged external to the coats of the follicle, may possibly occur in the unimpregnated woman?

Dr. Lee found what he calls a perfect corpus luteum, that is, an extra-mural corpus cephaloideum [which he regards as furnishing an unequivocal proof of impregnation], in the ovary of a woman who died from inflammation of the uterus soon after the expulsion of a mass of serous cysts; but this is not conclusive, there being much reason to believe that such hydatoïd structures are nothing else than conversions of genuine ova. The writer has seen similar extra-mural deposits occur double in gravid women in whom there was not the shadow of a cause for believing that they had had, on the occasions in question, more than one conception. This, which the writer imagines is the only kind of evidence which the case admits of, is, on the assumption that it is sound, a valid ground for believing, not only that these bodies, when they exist in the gravid female, are formed subsequent to impregnation, and not in the act, and are created by a reflected influence from the gravid uterus, and not by any irritation emanating from within themselves, but also, that it is at least a possible and presumable hypothesis, that in a similar state of the vesicles consequent on their rupture at menstruation, a corresponding conversion of them into extramural granular bodies, resembling those of utero-gestation, might be produced by the simultaneous accession of some other increased action of the uterus than that of pregnancy.

In regard, again, to the question, whether the very vascular granular structures which the writer has named corpora rubra may be met with in unimpregnated women, the writer has little except similar conjecture to offer. Roederer has recorded[2] an example of a body 'coloris carnei . . . . . sine cavo' which he saw in a woman, respecting whom, *as there was no evidence of her having been with child*, he supposed that she might have aborted. Solid corpora rubra,[1] such as appear to have been described in this instance by Roederer, and hollow red granular bodies, conversions of that modification of corpora cephaloidea termed by the writer extra-mural, do not begin to show themselves in the gravid state before the sixth month (although their presence in general indicates a much later period of gestation), and they rarely continue visible even when most perfect, as at the full term, so long as to allow the ordinary marks of pregnancy in the uterus, &c. to have disappeared; for which reasons Roederer's conjectures respecting this female must be held to have been gratuitous, and her case to have some weight in the present enquiry. The writer has seen[2] reddish cysts in menstruating women, but their constitution in regard to the absence of granular matter, and their want of solidity, was quite different from that of the fibrous rose-coloured bodies found in the gravid female. Whether such distinctions are essential or relative only, must be decided by future investigation.

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[1] First Series; Summary, 20.

[2] Icones, p. 43.

Another fact of some interest in the history of corpora periodica is, that the number of such bodies found in the ovaries of a gravid female may not only be greater than that of the fœtuses contained in the uterus, but also less.

MM. Bäer[3] and Bischoff[4] have seen this frequently, as it respects the ova in the tubes, in the lower animals, and they account for it on the principle that a Graafian vesicle does occasionally contain more than one ovum. The writer subjoins an example in the human subject, the recent preparation from which his description is taken having been supplied him through the polite attention of Prof. Pagan; and in attempting its interpretation according to the principles proposed in the present paper, it will be necessary either to adopt the explanation proffered by MM. Bäer and Bischoff, or to presume that the two ova had been furnished by separate vesicles, but that, in the one, the changes which issue in a corpus albidum had been far too advanced, before pregnancy took place, to permit even its extra-parietal vessels to be influenced by the succeeding uterine plethora and excitement.

[1] Medical Gaz. 1844-5, p. 371.

[2] First Series, P. II. S. VII. 11, 12.

[3] Lettre par Breschet, p. 20.

[4] Op. cit. p. 34.

Mrs. ——, aged about 30, mother of five children, two of them born at a twin birth, nine days before death, which was caused by apoplexy connected with diseased heart. An antrum communicated with the cavity of one of the tubes by a rugous opening, and the distal end of the other was expanded into a crescentic sac. Externally the ovaries were free from linear cicatrices, and bleached, their surface presenting numerous delicate vesicles; some on a level with the peritoneum, others elevated above it; and at other places, again, were slight indentations still raw as if from the recent rupture of vesicles of the same kind. On laying open one of the ovaries, a yellow slightly oval body, of the size of a dried pea, was cut through in nearly its centre. It was solid, and had a white point, of the size of a small shot, of delicate opaque membrane, in its centre. There was no yellow matter in any other part of either ovary, but interspersed throughout both glands were several soft white bodies of moderate size, and still capable of having their cavities demonstrated. They were Graafian vesicles, which had been emptied, and the coats of which, slightly thickened and opaque, were compressed together.

The ovaries were put into spirit and re-examined three days afterwards. The yellow body had become of a faint flesh hue, and presented at first sight some appearance of being inclosed in a delicate capsule; on minute examination no such envelope, however, could be demonstrated, and in separating the inner opaque central spot from the surrounding granular matter, it was found to consist of a double membrane, compressed into a flat form, with prolongations of itself thrust outwards into the flesh-coloured ring.

The only other matter which it occurs to the writer to add, respects a variety of corpus cephaloideum he has met with, in which the granular substance is disposed with the most perfect symmetry, but is destitute of any organised or other covering on its internal aspect. Those bodies have an exact resemblance to the most perfect corpora cephaloidea, having their inner pellicular lining either absorbed or expelled.

XII. *General Conclusions.*—1. The ovary is the primary sexual organ in the unimpregnated human female, as the uterus is in the gravid, and the mamma in the lactating, and exercises a remarkable controlling power both on its own functions as a gland, regulating them according to existing circumstances, and also on the character of the development of the other organs; properties recognised at least tacitly by the ancients, in their designation of the ovaries as the female testes.

2. The vesicles of the ovary were known to anatomists long anterior to the work of De Graaf; but were supposed to be dilated continuations of the seminal blood-vessels, in which, as in so many subsidiary chambers, the conversion of the blood into semen was completed.

3. The term ova, as applied to the germs of the mammalia, was employed from the time of Hippocrates; but they were supposed to be exclusively of uterine formation, and the result of fecundation, at least in their normal form, till the period when Kerckring, De Graaf, and others, attracted to the subject seemingly by Harvey's *Exercitationes*, demonstrated their origin to be in the ovaries, and antecedent to impregnation.

4. The fact of the discharge of sterile ova by virgin birds, and by fishes and insects, was familiar to Aristotle and others; but Kerckring, who wrote about a year before De Graaf, made the additional statement, that such ova are evacuated from the ovaries of quadrupeds, and also unconsciously by the unimpregnated human female, 'instante purgatione menstruâ, aut stimulante libidine;' and the physiologists who commented on his treatise indulged in analogical generalisation on the oviparous origin of the whole animal series, and on the spontaneous emission of germs from the ovaries, and their fecundation in the uterus, precisely as has been done in the present day.

5. There is reason to believe that what Kerckring supposed to be ova were merely portions of fibrin; but it is probable that the demonstration of the truth of the first and second of the views now referred to, of his commentators, which has been accomplished in our own time by MM. Bischoff and Raciborski, was prevented being reached, when they were first propounded, by the course of investigation having been turned by De Graaf and succeeding enquirers from the condition of the ovaries in the virgin, to the state in animals which had received the male.

6. The ovarian vesicles formerly mistaken for amphoric

enlargements of the seminal vessels, were, after Kerckring and De Graaf, mistaken for ova, although by Morgagni in particular, and also, but on erroneous premises, by Malpighi, and even after a confused manner by De Graaf, the discovery made recently by Von Bäer of these vessels as being alveoli in which the ova are retained, was distinctly anticipated.

7. The statements made by Baron Haller, and repeated by his followers, that ova are formed from the fluid of the ovarian vessels changed by impregnation, and afterwards discharged into the tubes, in which it assumes the ovoid form by coagulation; and that the number of follicles in the ovaries is limited absolutely to from twenty to thirty in each female,—are equally erroneous; ova at least, and generally their containing cells, being formed and secreted in indefinite numbers from the ovaries by the inherent organism and power of the latter as glands, throughout every period of female life.

8. The opinion held by Galen, and resuscitated, after a long interval of renewed belief in their cæcity, by Fallopius, of the perviousness of the uterine tubes, and that of their systolic and diastolic action, and of their conducting power from within at the ovaries, outward to the uterus, are correct.

9. The antrum tubi of Roederer is a hernial extrusion of the mucous and peritoneal coats of the tube, arising from the separation of the muscular fibrils, most probably by some mechanical cause, as the pressure of the fluid of the tube during the orgasm of the latter.

10. The incurvated distal extremities of the tubes are true receptacula ovorum, in which ova discharged from the ovaries may be retained for a short but indefinite time.

11. The tubes are at once oviducts and vasa ejaculatoria.

12. In early infancy, extreme old age, and long-continued organic disease, the ova are minute, transparent, and structureless cells; and in advanced childhood, soon after the critical age, and during pregnancy and lactation, they are more or less organised, larger, and in the latter state are often so well maturated, that about one-third of the renewed pregnancies of married women take place while they nurse.

13. In the children and others in the circumstances now mentioned, the exercise of organic power which occasions the

secretion and extrusion of ova, is attended also by that of an opaque mucous fluid in the tubes and uterus; but on the attainment by the female of maturity, and onward to the period of critical life [when the animal powers become again diminished, and the calibre of the arteries reduced], the ovarian orgasm, like many other vital actions, undergoes periodical augmentations of power, during which, unless when prevented by the disturbing influence of other functional processes or by disease, it extends to the nervous and vascular tissues of the uterus, and gives rise to the formation within this viscus of decidual vessels, which exude lymph and red globules, the latter being evacuated, mixed with watery fluid, mucous matter, and some of the salts of the blood, in the form of menstruation.

14. Every sanguineous uterine discharge, even when of moderate quantity and proceeding from a healthy uterus, is not necessarily of the normal menstrual kind here described, that is, the product of an ovarian orgasm, or natural function, acting through the medium of arterial villi shot out from the inner surface of the uterus, the blood in some such cases having been seen, after death, proceeding from the open mouths of the uterine veins; and there being reason to believe that such a hæmorrhage may be excited by whatever either temporarily or more permanently obstructs the venous circulation of the uterus, as the action of sudden fear, or of disease in the lungs or left heart, on the circulation of the right side of the heart; of tight lacing or other causes on that of the abdominal cava; and that of extensive ovarian enlargement on the corresponding veins of the uterus: but that to confound such discharges, which are generally coagulable, and met with in abnormal circumstances, with the catamenia, is to mistake a pathological phenomenon for the result of a vital and healthy function.

The frequent intermixture again of both arterial and venous blood with the ordinary menstrual secretions, which may be asserted to happen in women with profuse menstruation, is explicable on the principle, in the one case, of the operation of an unnatural intensity of the proper catamenial orgasm, and in the other, of that of an augmented irritability of the muscular fibres of the uterus, retarding by their spasmodic contraction the flow of blood in its veins.

15. The fact that the ovaries do undergo a periodical increase of size before and at the usual menstrual terms, is capable of diversified proof in various forms of disease of these glands, and has also been demonstrated in their healthy condition, as in the case of their hernial protrusion.

16. That this congestion is not caused by the presence or bursting of ripe vesicles, is plain from the consideration that the ovaries are often crowded with such, some of which also occasionally give way, and empty themselves by capillary-sized openings in the surface of the glands in women who have never menstruated; and in others who have ceased to menstruate, one and two large and fully-developed vesicles are frequently seen.

17. The catamenia are never regularly secreted without the Graafian vesicles attaining a state of high organisation, and being, in general, ruptured before they reach a larger bulk than that of a dried, or at most of a recent pea, the breach in their walls being facilitated by a considerable absorption of their peritoneal covering; while, when follicles of great natural strength exist in the ovaries independently of menstruation, as often occurs before its establishment and at its cessation, they are perforated with difficulty, remain long intact, often acquire an abnormal size, and their discharge, when it happens, is by a minute opening in the peritoneum, which corresponds with the size of that in their own walls.

18. The elimination of ova, and the process of menstruation, are correlative effects of the vital powers of the ovaries (just as the secretion of mucus, and of gastric juice, and the chymification of the blood, are of those of the stomach); and to suppose the rupture of the Graafian vesicles to be the cause of the menses, is to mistake a frequent association, and, to some extent, effect, for a uniform cause.

19. The principal use of menstruation is, in regard to the ovary, to provide an accessory by which the maturation of its vesicles, and the absorption of their peritoneal and tenacious proper coats, and their extrusion generally, may be promoted throughout the child-bearing period of life; and, in reference to the uterus, to furnish a nidus within its walls by which the ovum may be entangled, retained, and nourished.

20. Despite the discovery, in three or four instances, of zoospermes on the ovaries of some quadrupeds *post coitum*, the amount, variety, and character of the proof against the ovarian theory of generation in the human subject, appears to be insurmountable; and, in addition, the positive evidence in favour of the uterus being, at least in man, the normal seat of conception, and its occurrence in the tubes or ovaries exceptional only, seems conclusive; the cases of the latter which take place depending probably on the escape of spermatozoa along the tubes during menstruation, or on some accidental and rare arrangement of the mucus in the uterine ends of these, by which it becomes a conducting medium for the passage of the seminal corpuscles towards the ovaria.

21. Although menstruation may return for several successive periods without being attended by the formation of any of the organised bodies called corpora lutea—and that, simply because every menstruation is not necessarily preceded or accompanied by the rupture of a vesicle—the bodies so named are yet never found in the human female unless in association with that function, and in vesicles which have been ruptured in immediate connection with one of its returns; the vascular orgasm of the ovaries, which is the essential element of menstruation, being, also, the cause of corpora lutea.

22. A more correct descriptive generic term for these bodies, therefore, would be that of corpora menstrualia, or in reference to the lower animals, corpora periodica; the different species being arranged according to their physical peculiarities, as corpora cephaloidea, and corpora albida, after the manner described in the first series of these contributions.

23. Of these organised forms of corpora menstrualia, some, as the white and intra-mural cerebriform species, are *primary*, being formed exclusively under the influence of the congestive menstrual nisus; and others, as the red and extra-mural cerebriform varieties, are *secondary*, being transformations respectively of the two primitive species, and are produced by the reflex action on the still patent vessels of the recently-ruptured vesicles of the excited and congested gravid uterus.

24. The thickened, movable, œdematous, and yellowish state of the inner membrane of the unruptured Graafian vesicles,

described by MM. Bäer and Wagner as the consequence of impregnation, and the initiative of the corpus luteum, and which M. Bischoff observed in a dog which had not received the male, is often seen in the unbroken follicles of the human ovary, and is totally unconnected with pregnancy.

25. This swollen, puffy, or congested condition of the lining membrane, is best observed, in woman, in the larger vesicles, in which it projects as a vascular corrugated pulp, apparently produced by the effusion beneath the inner layer at points where this does not adhere organically, but merely by juxtaposition with the external, of a transparent fluid; the adhering portions of the two laminæ often remaining opaque or slightly yellowish, and communicating, from their arrangement in the form of decussating lines, a reticulated or chess-board aspect to the whole.

26. There is reason to believe that those changes are caused by the congestive orgasm of menstruation, and constitute the first stage in the growth of both species of primitive corpora menstrualia, the effusion in the one, or that of the white bodies, being limited to the cellulated structure of the ruptured membranes, which speedily becomes opaque, thickened, and inorganic; while in the other, or cerebriform bodies, the effusion is more copious, is granular, well organised, and deposited in the shape of convolutions between the layers of the vesicular parietes precisely in those spaces where the surfaces of the latter are free, the form of the convolutions being contingent on the situation of the adhesions or septa.

27. Immediately on the establishment of pregnancy, a reflex vascular influence arises towards the ovaries from the engorged and excited uterus, which, in the event of the existence in these glands of either of the above primitive menstrual bodies, terminates, in the case of the last-described species, on the vessels of its membranes and granular matter, increasing the size of the former, and the tenacity, bulk, and succulency of the latter, till, in the last months of pregnancy, its yellow tissue assumes a rose colour, and the body is transformed into the variety called corpus rubrum; while in those other cases, in which the primitive body has been of the species termed a corpus albidum, the uterine nisus, in consequence of the obliteration of the vessels ramifying immediately on the vesicle, does not extend farther

than the still patent vessels which connect the exterior of the follicle to the stroma of the ovary, in which situation a granular deposit takes place, as a secondary formation arranged in an annular form around the thickened vesicle; and sometimes, in consequence of the continued plethora of the parts, this structure, which constitutes the extra-mural cerebriform variety of corpora menstrualia, may be found in the last months of pregnancy undergoing a third transformation, and exhibiting a reddish hue.

28. The perfection of development in a corpus menstruale, whether primary or secondary, will be proportioned to the number, size, and vital activity of the vessels of the ruptured vesicle at the periods respectively of menstruation and impregnation; and as such properties in the vessels of the follicle must alter speedily, and also progressively, on the evacuation of the latter, it is reasonable to conclude that the changes wrought on its coats, either by menstruation or gravidity, will be much modified by the length of the period which intervenes between its rupture and their accession—a fact which explains not only the differences of degree in which such bodies are developed, but which also indicates the possibility of both menstruation and impregnation taking place in some abnormal instances without being succeeded by the formation of their characteristic sequelæ in the ovaries.

29. Should two or more Graafian vesicles have been recently and simultaneously ruptured before fecundation, the series of changes which make up the concrete of what is called a true corpus luteum of the species described in this paper as cephaloid, in its two forms of extra- and intra-parietal, and, although not yet verified by the writer, also, he believes, in the only remaining form—that of the corpora rubra, will take place indifferently in them all; while, should there have been only one Graafian vesicle ruptured, which has yet happened to contain two ova, both of which have been impregnated, or two vesicles ruptured, the vessels of one of which only remained permeable to the transudation of granular matter at the commencement of the pregnancy, there will, should both ova be impregnated, be two fœtuses in the uterus, and no more than one secondary menstrual body in the ovaria.

30. Taking into view the extra-ovarian and reflected nature of the cause which converts the primitive corpora menstrualia of the unimpregnated female into their secondary varieties during utero-gestation, connectedly with the previously ascertained facts of the subject, there does not appear to be anything impossible in the supposition that, in the event of a morbid orgasm of the uterus, such as might accompany several of its diseases of structure, being set up immediately on the formation of a corpus menstruale, the irritation and plethora of the uterus might become extended to such body, and control its development, somewhat in the manner of pregnancy.

31. Yellow or black unorganised deposits (the corpora flava and nigra of the former series) inclosed either in unruptured or broken vesicles, having their coats stained, but of natural consistence, are seen in the ovaries in every stage of life; but they are, so far as the writer has ascertained, nothing more than mere blood-marks—the colour of the vesicles being the product of mechanical and not of vital changes.

32. In regard to the bearings of the subject as they involve questions of jurisprudence, the facts are, summarily, that pregnancy may exist without the presence of any other structures within the ovaries than that, 1st, of one or more ruptured, but otherwise unchanged vesicles; 2nd. Of one or more discharged follicles, stained yellow or black with blood; 3rd. Of one or more broken vesicles partially converted into white or brain-like bodies; 4th. Of one or more fully-developed white bodies; 5th. Of one or more similar intra-mural cerebriform bodies; 6th. Of a single or of plural more or less perfect extra-mural cerebriform bodies; 7th. Of a single or of plural more or less developed corpora rubra, of either the intra- or extra-parietal kind; 8th. Of any of the appearances now enumerated, associated with either of the others; and that these phenomena are to be regarded as having an essential connection with the state of pregnancy with a measure of probability which, as refers to the first four, is at present strictly hypothetical, but which, with the succeeding three, augments directly in the order in which they are arranged; while, on the other hand, it is proper to state that there is

an abstract or hypothetical possibility that the appearances which are indubitably the usual adjuncts and indications of pregnancy, may yet in certain presumable combinations of circumstances (never, however, hitherto proven) present themselves independently of conception.

33. The inherent faculty of the ovaries, owing to which they vary their functional action according to their relative condition, is illustrated by their secretion of structureless cells in childhood, so that these can then be discharged irrespective of the aid of any special orgasm of the parts; and again in pregnancy—by which the occurrence of superfœtation, otherwise a probable event, is rendered rare; and again during lactation,—to the avoidance of the early renewal of impregnation; and, lastly, in the amenorrhœa of disease and age, when the evolution of the vesicles, not being any longer aided by menstruation, is anew facilitated, as in childhood, pregnancy and early lactation, by the extreme tenuity of their coats. It is, again, illustrated in the formation of well-organised tenacious vesicles in the child-bearing period of life—so well adapted equally to the specific functions of that period, and also to prevent their wasteful rupture on the frequent occasions of excitement to which adult life is exposed; and receives, again, another proof in the superinduction of the menses at this time, without which the normal rupture of the follicles, for the purposes of reproduction, could not, on account of their increased organisation, have been secured. The same accommodating quality of the ovaries is seen in cases where the menses have been suddenly arrested while the ovaries contained a number of the ripe vesicles always associated with that function. Such vesicles, no longer able, from the absence of menstruation, to penetrate the peritoneum, are translated, still covered by the peritoneum, to some part of the adjacent organs, where, separated from their nutrient vessels, they pass into the condition of inorganised bodies. The same principle comes into operation when, from any cause—such as the chronic peritonitis of children, the peritonitis which often follows abortion and pregnancy, and that inflammation of the fimbria and tubes which so frequently takes place in prostitutes, the tubes have become impervious, by the prevention, or speedy arrest, in such circum-

stances, of menstruation, and the consequent hindrance of the secretion of any other than such fragile, structureless, and small-sized vesicles, as can be easily and safely discharged without the aid of the tubes;—a species of amenorrhœa, therefore, which, should this view of its nature prove correct, ought to be regarded as inevitable, salutary, and not suited for treatment.

34. From De Graaf to Drs. Lee and Paterson, on the one hand, and from Malpighi to Negrier, on the other, physiologists have hitherto universally regarded the extrusion of ova from the ovaries as being effected by the agency of corpora lutea; only that, by the former series, these yellow bodies were supposed to be an effect of impregnation—a bastard modification of them being produced by sexual excitement and menstruation; while, by the other line, the same structures were believed to be formed by the coalition of several Graafian vesicles, the central bodies included within many of them, and which are nothing else than the contracted cadavers of the ruptured vesicles, being represented by most writers of both classes as the genuine ova.

35. In a like way as Kerckring's announcement of ova being formed within the testes of mammals was followed by speculations on their spontaneous excretion by the whole animal series, which would probably have terminated in a correct exposition of the physiology of the ovary but for the false principles introduced into the enquiry by De Graaf and Malpighi; so the demonstration by Von Bäer of ova within the vesicles of the ovary (although involved theoretically in the opinions previously held of the rupture of these by venereal orgasm, and in animals at the season of rut, and very tardily appreciated by those who treated the subject afterwards) is probably to be regarded as the true point of departure of the opinions now entertained of the spontaneous elimination of ova from the ovaries of all classes of animated beings, and is equalled in importance only by the discovery made more recently by MM. Raciborski and Bischoff, of the same bodies, escaped from the ovarian vesicles without the aid of the males, within the tubes of the virgin mammal.

CHAPTER IV.

HISTORICAL NOTICE: FROM 1846 TO 1864.

West.—Kiwisch.—Scanzoni.—Rokitansky.—Spencer Wells.—Grohe Pflügel.—Klob.—Wilson Fox.—Contents of ovarian cysts.—Analysis of Owen Rees and Scherer.—Ovarian gestation.—Arguments for and against dermoid cysts.—Opinions of Steinlin.—Relation of these cysts to subcutaneous cysts—Proof of their origin from an ovum.—Description of an ovarian dermoid cyst.

Before referring to the most recent researches into ovarian pathology, we may cast a rapid glance over the various opinions at present taught in our schools.

In our own country, the description of ovarian cysts given by Dr. West in his 'Diseases of Females' is perhaps that which has been most widely accepted. Dr. West classifies diseases of the ovaries under six heads:—I. Inflammation; II. Displacements; III. Simple Cysts; IV. Compound or Proliferous Cysts; V. Colloid Degeneration; VI. Cysts containing Fat, Teeth, &c.

Of the simple cysts, the most frequent form is mere dropsy of one or more Graafian follicles, the septa between which may or may not become absorbed. Dr. West, however, 'finds it almost needless to say that dropsical enlargement of the Graafian vesicles is by no means the only source whence simple ovarian cysts may be produced. There can, indeed, be no doubt but that the development of cysts may go on in the ovary, just as it does sometimes in the kidney, not by any enlargement of pre-existing cavities, but by a process which is one of new formation from the very beginning.' (Loc. cit. p. 490.)

Dr. West believes it probable that, in some cases, simple cysts may become proliferous; and he describes some varieties of endogenous growth which may possibly spring up within a Graafian follicle. This is, however, doubtful; but 'there can be no question but that some cysts assume their complex character from the very commencement, and are not developed out of any transformation of the Graafian vesicles.' (p. 493.) Among these multilocular tumors are included examples of cystosarcoma, a kind of tumor described by Müller, 'as principally composed of a more or less firm, fibrous, or vascular mass, but invariably containing solitary cysts in its substance. The 'colloid tumors' are regarded by Dr. West as malignant and essentially similar to colloid degeneration occurring in any other part of the body. In the ovary colloid is not unfrequently associated with other forms of cancer.

With regard to the hair cysts, Dr. West admits that they may in some cases belong to the category of monstrosities by inclusion, while in others they may be formed by an attempt at development on the part of the unimpregnated ovule. He thinks, however, that cutaneous cysts are occasionally found in circumstances which do not admit of either of these solutions, and for those he accepts the theory of Dr. Steinlin, which will be referred to further on.

Before referring to the views of Scanzoni and Rokitansky, we must briefly sketch the opinions which were held by Kiwisch, and which in some respects form the foundation of more modern German views. Kiwisch, after speaking of congenital absence, and want of development of the ovaries, and of their dislocations, neither of which subjects have much present interest to us, goes on to describe inflammation of the ovaries. The inflammation may attack the peritoneal coat, or the stroma, or the follicles of the ovary, and in the latter two cases may go on to the formation of abscesses. The next division of ovarian disease is the 'Hydrops Ovarii Simplex,' which is of course follicular. Under the fifth head, the (*Zusammengesetzte*) compound cysts formations, are included a variety of different structures. It might be divided into three sub-heads. 1. The Cystoid, including the multiple cysts of Dr. Hodgkin, secondary cysts within Graafian follicles, and secondary cysts not in Graafian follicles. 2. Alveolar degeneration, the so-called colloid. 3. Cystosarcoma and cystocarcinoma.

Among the solid tumors of the ovary are ranged, (*a*) *Hypertrophy*, generally due to chronic oophoritis, and never exceeding the size of a goose egg; (*b*) *Fat cysts*, including cysts in which hair, bone, &c., are found. They sometimes belong to Graafian follicles, sometimes they are new cysts;

(*c*) *Apoplexy*, which may be the result of the catamenia or may be traumatic; (*d*) *Fibroids*, either as hypertrophy of the stroma, or as a round fibroid similar to those found in the uterus; (*e*) *Enchondroma*, and bony tumors, which are very rare; (*f*) Cancers, scirrhous or medullary.

Scanzoni's definition differs somewhat from that of Kiwisch.

For him there are two great varieties of cysts; the first of which spring from the Graafian follicles, while the second are formed in the stroma of the ovary. For the formation of the simplest of all cysts, Scanzoni has an ingenious theory. He supposes that the menstrual nisus may in some cases be insufficient to produce the rupture of a ripe Graafian follicle, and may only cause a hypersecretion into its cavity, and a thickening of its walls. The next monthly congestion of the ovary finds the wall of the follicle strong enough to resist the excentric pressure of its increased contents, and so it goes on constantly gaining in size. An idea, almost the converse of this, was broached by Dr. West, in his book already referred to. Dr. West thinks it possible that a simple cyst may be the result not of a diminution of congestion, but of its excess, and that it is likely 'that in some cases at least a state of congestion of the vesicle and hæmorrhage into its cavity, are the first steps towards the production of the subsequent effusion.' * * * * And that 'just as hæmorrhage into the sac of the arachnoid is followed in many instances by the subsequent effusion of serum, so far exceeding in quantity that of the blood originarily extravasated as to produce one form of chronic hydrocephalus; so there can be no reason for doubting but that hæmorrhage into the sac of a Graafian vesicle may in like manner be followed by a similar hypersecretion.' (Loc. cit. p. 491.) To return to Scanzoni,—a number of simple follicular cysts may occur in one ovary, and may communicate in various degrees; their contents may become altered by hæmorrhage or inflammation, and their walls thickened by fibrinous deposit. The compound cystoid, which is as frequent a variety as the simple, is formed by degeneration of the stroma. Several of the lamellæ of connective tissue forming the stroma cohere together, and thus form perfectly closed capsules, which, as long as they do not exceed a certain size, flatten themselves out by mutual compression, and enclose a many-sided space. These spaces are converted into cysts. The contents of these compound cysts are most varied—serum, blood, fat, teeth, &c. Thus far has Scanzoni attempted to draw a line between simple and compound cysts, follicular and stromal degeneration. He is, however, unable to do so in all cases. He describes as simple, some cysts with thick walls, in whose interior are found numerous papillary new formations, some larger, some smaller, which in some cases grew so as to fill up the cyst entirely, thus converting it into a solid tumor, while in other cases the papillæ themselves are capable of cystic degeneration, and so by indigenous cyst formation, convert the simple into a compound cyst.

Scanzoni accepts Virchow's description of colloid or alveolar degeneration, but, of course, does not share the opinion as to its frequency which Virchow at one time held. Out of forty-one cases of ovarian tumor, nine were colloid. The jelly-like substance may liquefy, becoming a flocculent straw-coloured mucous fluid. Cystosarcoma and cystocarcinoma conclude the list of cystic degeneration of the ovary, while the more solid tumors are described under the heads of Fibroids, Enchondroma, Scirrhus, and Melanosis.

If Scanzoni has described degeneration of the stroma, Rokitansky has gone a step further and described degeneration of another normal constituent of the ovary, the corpus luteum. Sometimes the yellow matter forms a hernia, and projects from the vesicle which contains it. This is probably a result of excessive growth. At other times the corpus luteum appears to be double. A layer of the yellow matter is formed, a new hæmorrhage takes place, and then a new layer is deposited. Or fluid may go on being secreted in the corpus luteum, and there will result a cyst with walls of a dirty yellowish white. This fact must be regarded as having been known for long. Among such cysts must be reckoned those which have been described as tubo ovarian; an example of which was found in the case of Mrs. Manning, who was executed some years ago. (Tilt, 'Diseases of Ovaries,' 2nd edition.) Besides these varieties, Rokitansky describes a sarcomatous degeneration of the corpus luteum. The sarcoma is always round, never exceeding a walnut in size, and is contained in a strong capsule. Probably it is the blood clot in the centre of the yellow body. The corpus luteum is susceptible, too, of carcinomatous degeneration.

Among the new formations in the ovary, Rokitansky dwells at considerable length upon sarcoma. He is of opinion that just as a sarcoma of the uterus may become cystic, so may one of the ovary. In either case, he thinks that this so-called cystic degeneration is, in point of fact, formation of new gland structure. His idea is, that when a fibrous tumour of the womb becomes cystic, it is because the uterine glands send projections into it, forming, as it were, a sort of enormous polypoid growth from the exterior of the uterus. The same thing takes place in the ovaries. Glandular stricture identical with that of the uterine glands is formed; and this it is which constitute the spaces in the 'cysto-sarcoma uterinum ovarii.' In other respects, Rokitansky differs in no way from other observers. Simple cysts are enlargement of the Graafian follicles, for he has found an ovum in them. Compound or proliferous cysts are peculiar structures occasionally found in other parts of the body, but by far most frequent in the ovary. Colloid degeneration finds its place among other cancerous affections of the gland, and tubercle is mentioned as rare.

In the year 1862, Mr. Spencer Wells showed to the Pathological Society a specimen of ovarian disease, which he described under the name of 'Adenoma of the ovary.' One large cyst of a multilocular ovarian tumor was filled with semi-solid matter, much resembling soft cancer. On microscopical examination, however, it 'was seen that the surface of growth was fringed with papilliform villi, its substance showing in vertical sections a delicate fibrous stroma, forming round or oval alveoli. These alveoli are lined with densely-grouped epithelial cells, forming a continuous zone which encloses an area loosely packed with cellular elements of similar form. On the margins of most sections the contents of the alveoli are frequently seen to protrude like papillæ through ruptured portions of fibrous septa; or the living zone of the alveolus has become liberated and divided so as to assume the appearance of a long cylindrical band or column of epithelial cells.' From these characters Mr. Wells thought that the tumor evidently belonged to the class of fibro-epithelial growths, and, from the folliculoid character of its alveoli, it would best be described as 'Adenoma.'—

(*Medical Times and Gazette,* Oct. 1862. Diseases of the Ovaries, vol. i. p. 122.)

In the same year, 1862, Professor Grohe, of Griefswald, published a paper in Virchow's Archives, 'Ueber den Bau und das Wachsthum des menschlichen Eierstock, und über einige Krankhafte Störungen desselben.' (On the structure and growth of the human ovary, and on some of its morbid lesions.) If, says Grohe, we examine a transverse section of the ovary of a child, between one and two years of age, we see that it is composed of a cortical and a medullary layer, the latter corresponding to the hilus of the organ. This fact was strongly insisted upon by Dr. Farre, in the article 'Ovary,' in Todd's 'Encyclopædia of Anatomy and Physiology.'

We are told by Farre in his description that the central portion of the ovary consists of stroma and blood-vessels only, while the peripheral part is composed entirely of closely set ovisacs, containing ova of various sizes. Grohe's description is somewhat more detailed. He tells us that at birth the stroma consists of small spindle-shaped cells, most of which contain an oval, or elongated nucleus, and a shining nucleolus of round cells and of loose fibrous tissue. He tells us that the medullary portion consists of this stroma and of blood-vessels, which, for the most part, run parallel to the course of the fibres of the stroma; but he chiefly interests us when he describes the minute anatomy of the cortical layer. The cortical layer at birth is composed of a number of small heaps of minute cells, concentrically arranged around a larger nucleated one, which subsequent changes show to be the germinal vesicle. The most external of the concentrically arranged cells gradually assume a spindle shape, and are at length converted into true fibrous tissue, thus forming alveoli in which the ova, surrounded by their attendant cells, are contained. In later life these alveoli are found to be provided with vessels and unstriped muscular fibres. Grohe can trace the origin of these also. Immediately under and connected with the ovarian ligament is a fibrous-looking cord, which on strict examination is found to contain blood-vessels and unstriped muscular fibres. As it approaches the fibres of the ovary, this cord splits up and assumes a fan shape. Some of the fibres loose themselves between the folds of the broad ligament with others, and these are the majority, penetrate the ovary, and are distributed to the walls of the alveoli. At the moment of birth the germinal vesicle is 0.014 to 0.017 inches in diameter. Its circumference may be easily distinguished, and its nucleus, the germinal spot, is 0.007 inches in diameter. Immediately surrounding the germinal vesicle is a clear granular layer, the first trace of the yolk, but no sign of the yolk bag is to be made out. External to the yolk lie those smaller cells which have already been mentioned, and which are usually regarded as the epithelium of the follicle. Their size differs very considerably, varying from 0.0035 to 0.0241 inches. Kölliker, Barry, Bischoff, and others, have described a membrana propria, a structureless membrane, formed around those epithelial cells, either by their coalescence or by secretion from them. Grohe, however, denies the existence of such a structure.

It is interesting to compare Grohe's theory with that of Spiegelberg, who regards the primary follicle as a large parent cell. The small epithelial cells contained within it are its nuclei, and their membranes become intimately united with the areolar tissue forming the walls of the mother cell. The nuclei go on multiplying, and, as soon as they have filled the parent cell, one of them, usually near the centre, increases in size. A new nucleus appears in it, and its membrane becomes distended with granular matter, and thus the ovum is formed. According to this view, the follicle is a cell, and the ovum and membrana granulosa are so many nuclei.

Grohe goes on to tell us that the stage of development to which the primordial follicles have attained at birth varies in different animals, the follicles being largest and most developed in those animals who are early matured. Still he remarks, somewhat naïvely, cases have been known where follicles were visible to the naked eye, even in the human species, at birth. To the support of this, he quotes Bischoff, and says, that Vallisneri even goes further, and asserts that these little bladders are to be found in the ovary of the embryo. This, however, Grohe cannot believe, and he concludes that Vallisneri must have been examining a pathological specimen. Grohe, however, has seen the follicles at birth in the human infant. From the first to the second year they are anything but uncommon, and after that they are almost constantly to be met with. In the very early state, Grohe has observed both in man and in other animals that the largest follicles are to be found not towards the periphery of the ovary, as is the case at a more advanced period, but in the medullary layers. He attributes this to the freer vascular supply which is sent to the medullary than to the cortical layers of the ovary. And reasoning from this and other data, he is inclined to lay great stress upon the ovarian circulation as exerting a direct and decided influence upon the development of the follicles. In the ovary, as in other glands, Grohe imagines that he has discovered the existence of two distinct varieties of circulation. A *nutritive*, meant for the nourishment of the gland itself, as an organ or constituent of the body; and a *functional*, which only exists at certain times and is essentially local in its character. Whenever this functional circulation is called into play, then the follicles make rapid strides in development. It is difficult to say whether the first impulse to the development of the follicles is given uniquely by the increase of blood-vessels in its capsule increasing its supply of nutriment, or to a true manifestation of cell life in the primordial follicle.

After birth, some curious changes are observable in the follicles near the periphery of the ovary. It not unfrequently happens that the epithelial cells, which at an earlier stage were very abundant, become rarer or even disappear, leaving only nuclei in their place. At the same time the yolk may become granular or filled with oil globules, the germinal vesicle becomes clouded, and the germinal spot is no longer to be distinguished. Grohe asks whether these changes are physiological. Is it possible that the epithelial cells are used as nourishment for the ovum? Certainly many follicles disappear in this manner by involution, and it is difficult to say how far the involution may proceed without destroying all chance of repair. It is reasonable to suppose that when the germinal vesicle has disappeared, the follicle is no longer capable of performing its function. The involution is frequently observed in the ovaries of children who have suffered from tubercle and other exhausting maladies, and it would be interesting if we could find out whether this early destruction of primordial follicles is ever the definite cause of sterility. Grohe reckons the number of primordial follicles in each ovary at about 2,000, and he believes that after birth no new ones are formed.

There is a difficulty in understanding how a follicle whose cellular elements, with the exception of the ovum, have all disappeared, should become lined with epithelium; in other words, how the membrana granulosa is formed. Grohe thinks that probably the few nuclei and cells left *regenerate*, and once more become perfect cells. He prefers this theory to the supposition that the membrana granulosa is derived by budding from the stroma, or by cleaving from the yolk. With regard to the formation of the zona pellucida, Grohe gives us little information, but thinks it most probably is derived from the cells of the membrana granulosa.

The primordial follicles are liable to certain morbid alterations which might be classed under three heads: — 1. Arrest of development; 2. Excess of development; 3. Inflammatory changes. Besides those, there perhaps ought to be mentioned mechanical injuries, extravasation of blood, neoplasms, &c. The arrest of development has already been referred to as involution of the follicles. It may go on to such an extent that nothing but fibrous tissue may be left in the ovary. By excess of development Grohe means an excessive or premature growth of Graafian follicles. In speaking of this subject, he says:— ‘Different opinions may be held as to whether ovarian maturity only commences at puberty, or whether it is to be reckoned as having begun from the moment when ripe Graafian follicles are to befound in the ovary. An essential difference between the two moments lies in this, that as far as I know, it has never been observed that a germ has escaped from a follicle before puberty, and entered the oviducts, except just at the commencement of puberty. . . . The idea that puberty depends upon the degree to which the Graafian follicle and its contained ovum are developed is shown to be incorrect, for long before puberty, from the second and third year, Graafian follicles are to be found with ova, &c., which have reached the same degree of development as in years of maturity.’ From these sentences it is evident that Grohe, while corroborating my father's observations up to a certain point, was not acquainted with these observations. Ritchie, in 1845, did what Grohe repeated in 1862. He showed us that follicles are constantly being developed in the ovary and constantly disappearing, independently of menstruation. My father describes the little follicles as bursting before as well as after puberty, after as well as before the menopause. Grohe does not think that the follicles burst, but they degenerate. The liquor folliculi is absorbed, the membrana granulosa undergoes fatty changes, the ovum is lost, the cavity of the follicle diminishes, its sides approximate, and nothing is left but a scar. In other cases a hyaline membrane (Glas membran) is developed, and a larger scar results, in the formation of which many neighbouring primordial follicles are destroyed. Grohe closes his valuable paper by an intersting case of traumatic degeneration of the ovary. After a very tedious breech labour a female child was dragged out dead, a clot was found in the peritoneum, and one of the ovaries was converted into a mass 1¼ in. in diameter. It was composed of meshes, into each of which blood had been poured.

Shortly after the publication of Grohe's paper, Pflügel of Bonn issued his work, 'Ueber die Eierstöcke der Säugethiere und des Menschen,' Leipsic, 1863 (On the ovaries of mammals and of man), with the distinct purpose of drawing attention to the tubular nature of the ovaries in the early stages of development.

The idea of the ovaries being originally tubular by no means originated with Pflügel.

In 1838, Valentine, in a paper in Müller's 'Archives,' asserted that in mammals the ovary originally consists of tubes with two blind extremities. Every observer after Valentine denied the existence of the tubes, until Billroth ('Ueber fötales Drüsengewebe in Schildrusen Geschwülsten;' Müller's 'Archives,' 1856) reasserted their existence, and pointed out that the Graafian follicles were formed by their division into partitions. Still few believed in them, and as we have already seen, Spiegelberg and Grohe do not refer to them. Part of Pflügel's observations had been published in a paper as early as 1861. The monograph referred to, however, is enriched by many additions. The work will very well repay an attentive perusal. Some of the results arrived at are most startling; and as the fullest details are given as to the means of verifying the observations, it is to be hoped that soon we may be in a position to say whether real progress has been made, or whether most of the appearances observed were delusive.

Of course only a very brief summary of Pflügel's researches can find a place here.

A young cat's ovary consists of a number of tubes whose general direction is perpendicular to the surface, but which anastomose most freely with each other by lateral branches. The tubes may, in some cases, be isolated, and evidently possess a membrana propria. Their diameter varies from 1 mm. to ·009 mm., the most delicate extremity pointing to the surface of the ovary.

In very young tubes the superficial extremity terminates in a tapering point whose limits cannot be defined, on account of its extreme minuteness. In tubes a little older, the rapid increase of the contents causes the superficial extremity to swell out and assume a club shape. The little club-shaped cæcum thus formed is called by Pflügel, the *Germinal Division* (Keimfach), for it is in it that the first trace of the ovum is to be discovered. It is filled with a finely granular protoplasm, and with clear nuclei, some of which are in the act of fusion. At first the nuclei are surrounded by a layer of protoplasm, but are not covered with a cell wall; but after some time a few of the nuclei become more developed than their fellows, a cell wall is discovered environing the protoplasm, and at the same time a nucleolus makes its appearance. The cell (primary ovum-urei) is now 0·0090 mm. in diameter, the nucleus is nearly as large, and the nucleolus (germinal spot) is ·0029 mm. To trace further changes we must examine the contents of the tube at some distance from its superficial cul-de-sac, as the ova are more developed in proportion as they approach the centre of the ovary. In ova slightly larger than those just mentioned we may see extraordinary changes take place under our eyes, provided only we examine them immediately after their extraction from a living ovary.

A small part of the periphery of the cell becomes cut off by a constriction, giving an appearance as if a bud had been thrown out by the parent cell. This bud increases in size, and the original cell of course diminishes in proportion, until perhaps finally nothing whatever remains of the original cell. It has become merged in its secondary production. It is curious to watch the germinal vesicle (nucleus) slipping through the constriction from one division of the cell into the other. But a more curious phenomenon still may be observed. On several occasions Pflügel has seen the germinal vesicle caught in the constriction, and along with the cell divide, so that instead of one cell there were now two, each provided with its nucleus. The nucleolus did not divide, but a new nucleolus soon appeared, as if by precipitation, in the nucleus of the new cell. Sometimes, before the fusion is complete, the new cell throws off a bud, so that it is not uncommon to find a chain of several ova cohering together (Eikette). As soon as the ovum has attained the size of 0·0240 mm. its motions become languid and soon cease altogether. Simultaneously with these changes others are going on. In the germinal division (Keimfach) the primordial ova lie closely together and line the tube just as ordinary epithelium does. When more developed, however, they are separated from each other and from the walls of the tube by layers of smaller cells, the first appearance of the membrana granulosa. The ovum increases in size, the zona pellucida is formed of deposit from the yolk upon the yolk bag, the cells of the membrana granulosa multiply by budding, the tube becomes gradually cut off into compartments, each of which encloses an ovum, and thus the Graafian follicle is produced. But it may be asked 'How are the tubes themselves formed? Whence do they arise?' Pflügel's answer to this question upsets all our preconceived ideas. He first shows that the peritoneum consists of nothing but polygonal cells closely adhering together, that the vessels, nerves, and other complicated structures lie in the subserous layer. He draws an elaborate parallel between serous membranes and gland structures, and makes the following remarkable statement:—'I hold that serous membranes are glands, and I describe as essential a layer of epithelium which perhaps lies upon a structureless membrane, the tunica propria of the serous glands.' He thus regards the peritoneum as an immense secreting follicle whose duct is the Fallopian tube, and he asserts that the tubes of the ovary are mere projections from this follicle. He traces the continuity of the cavity of the young ovarian tubes with the cavity of the peritoneum, and he brings us logically to the conclusion that Graafian follicles are nothing but buds from the peritoneum, and that the ovum itself is only an epithelial cell. The development of young ova is not confined to the first few weeks of existence. On the contrary, it seems to be periodical, although the period does not correspond with that of rut in the lower animals. It is probable that it only takes place in spring and autumn just as is the case in plants. There are many other interesting points which Herr Pflügel has or imagines he has elucidated. He has not only discovered the micropyle, but even its mode of formation. He speaks of an epithelium lining the vitelline membrane, although the ovum for all that continues to be a cell. He describes the degenerative metamorphoses of ova not destined to arrive at maturity, and he leaves us with the impression firmly fixed in our minds that we are still in the dark, and that the more we peer into it the more impenetrable becomes the darkness.

The last systematic work on diseases of women was published in Vienna last year. It is entitled 'Pathologische Anatomie der weiblichen sexual Organe,' and its author is Dr. Klob of Vienna. Klob has evidently paid very considerable attention to the disease of the ovaries, and he bases their morbid anatomy upon their normal anatomy as expounded by Grohe. Klob believes that pathological changes are only slight excesses or failures of formation. The excess or arrest of development may occur in three different periods of the ovary's history, and its effects will differ considerably in the three cases. Development may be arrested before it was well begun, while still the embryo is in the maternal womb, or it may be arrested between birth and puberty, or it may be arrested after puberty. At any of these periods development may be excessive instead of arrested. As far as we know, there has never been a case recorded where more than two ovaries were discovered in the same body, but instances are certainly on record where the existing ovaries were double the normal size. On the other hand, several observers have published cases of total absence of the ovaries, and instances of children having been born with rudimentary ovaries as well as rudimentary wombs can scarcely be regarded as great rarities. Those rudimentary ovaries may consist exclusively of fibrous tissue, or, as Rokitansky has shown, there may be a sort of transition between ovarian and testicular tissue. In the second period of ovarian life, viz. from birth to puberty, Klob says that there may be excessive development. He disagrees with Grohe as to the cause of menstruation. Grohe asserted that menstruation is not dependent on the stage of development to which the Graafian follicles have attained. Klob says that the perfect development of Graafian follicles and the appearance of the catamenia stand to each other in the relation of cause and effect. If the Graafian follicles are developed at a more early stage than usual, menstruation will be precocious; and conversely, if menstruation be precocious, we may be sure that there is a premature development of follicles, that it is a case of excess of development between the periods of birth and puberty. As to the different modes of arrest of development at this stage, Klob entirely agrees with Grohe in his description of the involution of primordial follicles. In the third stage, the period of nubility, Klob believes that only the fibrous stroma of the ovary is liable to excess of formation; he is of opinion that new follicles are never produced. The arrest of development is characterised by the disappearance of all follicles, nothing but the stroma being left behind.

The ovaries occasionally change their position in an extraordinary manner. They become twisted on their transverse axis. The outer angle becomes inferior and the internal, so making a half-twist, and then by becoming successively superior and external it may complete the twist. Or the rotation may be in the opposite direction, the inner angle becoming inferior and then external. The former is, however, according to Klob, the most frequent variety.

The rotation occasionally occurs in healthy ovaries; but it is most frequently observed in those which are enlarged by disease. The rotation in these cases is probably produced by an attempt on the part of the ovary to adapt itself to surrounding organs. It is conceivable that if a cyst became developed in the external angle of the ovary, it would at first have the tendency to fall downwards by its own weight; while subsequently, if it went on enlarging, it would tend to rise out of the pelvis, and might do so, from the uterine angle of the ovary. The phenomenon is an important one, because by compressing the ovarian vessels it may first produce congestion and inflammation, and then even gangrene; or it may proceed to such a degree that the pedicle of the ovary gives way, the ovary being twisted off just as in some animals the operator twists off the testicle in performing castration. Dr. Turner, of Edinburgh, drew attention to this some time ago. He related several cases where the ovary had been regularly transplanted, where the normal attachment to the uterus existed no longer, the ovary deriving all its nourishment from extraneous sources.

This transplantation of the ovary is not necessarily the result of rotation; it may be produced by any cause which drags the ovary from its normal attachment. A case is related by Professor Simpson of a lady who, when stretching herself, ruptured the pedicle of a sub-peritoneal fibrous tumor of the uterus, which had contracted firm adhesions with the abdominal wall in the epigastrium. This case proved fatal, because the vessels in the pedicle were still very large, and their rupture caused severe hæmorrhage into the peritoneum. Had the case gone on some time longer, the proper pedicle of the tumor might gradually have atrophied, and at length given way, while the circulation was kept up from the vascular adhesions.

To return to Klob. We find in his book a description of the corpus luteum and its morbid changes. He believes the corpus luteum to consist of hyperplasia of the areolar tissue, forming the most internal layer of the ruptured Graafian follicle; the yellow colour being due to fatty degeneration. The morbid affections, of which the corpus luteum may be the seat, are described by Klob as they are by Rokitansky. In talking of the simple cysts of the ovary, those which undoubtedly are nothing but dilated follicles, Klob notices the frequent occurrence of a fibrous network in their walls. This network he supposes to be the obliterated remains of the vessels which were wont to support the follicle; and he asks whether the obliteration of the vessels is not, in all probability, the origin of the cyst formation. Klob has no belief in the complicated forms of adventitious cyst development. According to him all ovarian cysts, all examples of so-called alveolar or colloid degeneration, are formed from Graafian follicles or their prototypes. The form of cysts differs according to the relative size of their loculi. Forster enumerates three varieties of ovarian cysts. In the first, the so-called alveolar degeneration, the ovary rarely exceeds the size of an apple, and is composed of innumerable little cavities, the size of a millet-seed. In the second, a simple cyst has far exceeded all others in size. In the third, the ovarian tumor is enormously large; but the loculi are all nearly of a size. Of course there are all sorts of varieties and shades between each class. Klob describes well the different changes which hæmorrhage and inflammation may produce in ovarian cysts. He talks at some length about the discovery of cysts containing skin, hair, and striped muscular fibre. On this point he says (page 363), '*Accidental* new formations occurring in ovarian cystoids are particularly interesting. Among them may be reckoned productions of striped muscular fibre, brain and nerve matter, external skin, with hair, bone, and teeth.' In speaking of cancer of the ovary, Klob refers to a case where Rokitansky had pronounced the opinion that the carcinomatous degeneration unquestionably sprang from a corpus luteum. A word on tuberculosis of the ovary, and on entozoa, finishes the article. Klob's book must be regarded as the latest expression of German opinion on the subject of ovarian disease. The great doctrine that he inculcates is, that all cysts, nay, all morbid alterations of the ovary, are only errors in nutrition, or of easily discoverable external agencies. He fails, however, to account for some varieties of secondary cysts; he gives us no theory as to the formation of dendritic growth, and he is content to characterise the occurrence of such structures as striped muscular fibres and bone as accidental new formations.

Very recently, Dr. Wilson Fox laid the results of a series of observations which he had made on ovarian tumors, before the Royal Medico-Chirugical Society. Dr. Fox believes that all ovarian cysts arise from Graafian vesicles, the multilocular tumors being due to secondary formations within the parent cyst, &c.

The secondary formations may arise in one of these ways. In the most common form, the epithelium lining a Graafian follicle becomes stratified, and a number of little villi formed of the fibrous outer wall project into it, each villus being accompanied by a delicate loop of vessels.

The stroma gradually overgrows these epitheliated papillæ, and converts their enclosed interspaces into tubes, and finally, by the cohesion of their walls, into shut cavities, soon to be distended by their own secretions. In the second form the Graafian vesicle sends out tubular projections from its wall. These projections invaginate themselves into a neighbouring cyst, their open extremities close, and they become, to all intents, secondary cysts; although they are not lying in the vesicles which produced them, but in one accidentally near it. The third class of cases are those where cysts contain dendritic growths. Dr. Fox considers these growths to be solid excrescences from the stroma of the ovary, containing vessels and covered with epithelium. The growths give off branches in every direction, and it is not difficult to imagine that these branches occasionally meet and cohere in such a manner as to form an enclosed space, which is necessarily buried with epithelium. Dr. Fox believes that the fluid contents of cysts are not due to any degeneration of the stroma of the ovary, but that their varying reactions are owing to the conditions of pressure under which they are secreted. Dr. Fox is inclined, from personal observation, to corroborate Pflügel's observations as to the tubular nature of the ovary in early life, and he believes that the varieties of cystoid tumors must be traced to 'a renewal in the adult of the early mode of development of the Graafian vesicle with various morbid aberrations from the type of embryonic growth, a morbid condition of which we already possess instances in the mamma, the testicle, and the thyroid gland.' Dr. Fox has not had any opportunity of examining cysts containing dermic structures, but believes that they will be found to follow the same general law as the others.

CONTENTS OF CYSTS.

The determination of the chemical nature of the fluid contents of ovarian cysts has not only a pathological, but also a practical interest, as the examination of fluid removed by tapping may lead to a right diagnosis in a doubtful case.

In the third volume of Guy's Hospital Reports, Dr. Owen Rees published the following table, showing the result of the 'examination of four fluids drawn from the secondary cysts of an ovarian tumor, and one (No. 5) probably from an ovarian cyst.' All the fluids had the mucoid character.

	I. Clear light straw-coloured alkaline. Sp. G. 1017	II. Dark-coloured muddy neutral. Sp. G. 1017	III. Approaching in character the white of egg. Alkaline	IV. Clear straw-coloured, containing flakes of a pearly, scaly looking substance	V. Sp. G. 1009. Alkaline, very tenacious.	VI. Analysis of serum of blood
Water	190·9	190·70	195·2	187·7	195·32	181·2
Albumen, with traces of fatty matter	4·1	4·25	1·8	7·6	0·54	16·5
Albumen existing in solution, as albuminate of soda	3·7	3·62	1·1	4·0	*2·22	0·4
Alkaline chloride† and sulphate with carbonate of soda, from decomposed albuminate	0·8	0·78	1·2		‡1·08	§1·6
Extractive, soluble in water, and alcohol	0·4	0·45	0·5	0·5	0·54	§0·3
Chloride of sodium with carbonate, from decomposed lactate of alcoholic extract	0·1	0·20	0·2	0·2	0·30	—
Totals	200·	200·	200·	200·	200·	200·

Dr. Rees was struck with the great quantity of water in all the specimens, comparatively with the serum of the blood, and also with the excess of the extractives and the deficiency of albumen. He thought that the mucoid character of the fluids was due principally to the albuminate of soda (watery extractive insoluble in alcohol), and he was the more of this opinion because Dr. Babington had recently succeeded in forming a

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* This albumen existed only in part as albuminate of soda.

† In very small proportion, being in great part separated with the alcoholic extract.

‡ This was decomposed lactate, with traces of phosphate.

§ The whole of the alkaline salts are estimated together, as indicated by the line.

mucoid fluid, by adding alkalies to albumen (Guy's Hospital Reports, vol. ii. p. 534). The mucoid character was not due to the excess of water, but to the *nature* of the solid matter. The flocculi in No. 4 consisted of cholesterine, 3·4; albumino-cerous matter with traces of albumen, 1·9. This last substance has been met with in the thyroid gland, in hydrocele and elsewhere. (Bostock, Med. Chi. Trans. vols. ii. iv. and xv.) It differs from albumen in being insoluble in potash, and from cholesterine in being insoluble in boiling alcohol: it otherwise closely resembles cholesterine.

In 1843, Scherer (Chemisch und microscopisch Untersuchurzen, Würzburg) gave an account of the chemical and microscopical appearances of ovarian fluids.

I. The first fluid examined was from a multilocular tumor. Microscopically it was found to contain—

(1.) A great number of free nuclei.

(2.) Cells $\frac{1}{300}'''$ in diameter, like spherical blood-vessels, but containing several nuclei.

(3.) Masses of free inflammation corpuscles (Entzundungs Kugeln).

(4.) A flocculent membrane, consisting of many granules cohering by their circumference.

(5.) Epithelial cells.

After long standing, the fluid precipitated a red deposit containing blood cells. The fluid itself was alkaline, it was so thick that it could not be filtered, and it coagulated on the simple addition of water.

Its specific gravity was 1022, and in every 1,000 parts 417·8 were solid. Of these 5·27 were inorganic, and on being analysed gave the following results—

Sodii Chlorid.	4·08
Sod. Phosphat.	0·40
Potass. Sulphat.	0·14
Sod. Carbonat.	0·25
Calcis Sulphat.	0·10
Calcis Carbonat.	0·06
Calcis Phosphat.	0·14
Ferri Oxid.	0·02
	5·19
Total	5·27
Loss	·08

Five weeks later this patient was again tapped. The fluid was lighter, and, on standing, threw down a flocculent sediment, consisting of free granules, of flakes formed by the juxtaposition of these, and of cells $\frac{1}{100}'''$ in diameter, spherical, and full of dark contents.

Out of 1,000 parts, 59·1 were solid; and of these 42·62 were precipitated by boiling, after adding an acid. About 5·58 parts were inorganic. 100 parts of the inorganic matter contained—

Sod. Chlorid.	77·2
Potass. Sulphat.	9·8
Sod. Phosphat.	1·2
Sod. Carbonat.	7·2
Calcis Phosphat.	2.5
Calcis Carbonat.	2·1
	100·

II. The second fluid examined was yellow, thick and slimy, containing granules and exudation cells.

In every 1,000 parts, 132·43 were solid; and of this—

27·65	parts	were	mucus-like, with exudation cells.
55·70	„	„	albumen, coagulable by heat.
30·26	„	„	albuminate of soda, precipitated by heat and acetic acid.
4·70	„	„	fat.
3·52	„	„	alcoholic extract.
2·35	„	„	waste.
7·81	„	„	inorganic.

Scherer lays down the composition of mucin (precipitated by water or acetic acid) as—

Carbon	55·443 parts	
Hydrogen . . .	7·114 „	or $C_{48}H_{76}N_{13}O_{12}$
Nitrogen	18·305 „	
Oxygen	19·138 „	Or, Protein + $NH_3 + O_2$.

III. Another cyst from the same tumor contained a rusty-brown fluid, with granular cells and fat-globules. It was alkaline, acetic acid threw down a precipitate soluble in excess, but redeposited by ferrocyanide of potassium. In 1,000 parts 96·89 were solid. Of these—

40·38	were	coagulated by acetic acid (mucin and albumen).
36·50	„	albuminate of soda.
3·40	„	fat.
6·07	„	extractive.
8·54	„	inorganic.

A third cyst contained fluid consisting of—

Water	839·904
Solid matter	160·096
	1000·

Of the solid matter . 150·534 parts were albumen and albuminate of soda.
1·456 „ „ extractive.
8·006 „ „ salts.

This case seems to have been one of cancer of the ovary, as numerous caudate cells were found.

The next case was colloid.

799·85 parts were water.
200·15 „ „ solid matter.
1000·

Of the solid matter, 172·09 parts were albuminate of soda.
3·13 „ „ fat.
14·50 „ „ extractive.
10·43 „ „ inorganic.
200·15

The colloid substance mixed with water without losing its opalescent hue. After some time, however, a flocculent precipitate of granules and cells was thrown down. The supernatant fluid had the following reactions :—

With hydrochloric acid.—No effect: if ferrocyanide of potassium were added there was no precipitate, but the fluid became jelly-like.

With sulphuric acid.—Threw down a little jelly soluble in excess of water.

With nitric acid.—Flocculent whitish precipitate insoluble in excess. Fluid became jelly on standing.

With chromic acid.—At first nothing, afterwards a yellowish coagulum.

With alum.—Nothing.

With bichloride of mercury.—White precipitate.

With gallic acid.—White precipitate.

If alcohol were added to the ovarian fluid before any water was added, it caused coagulation.

If two volumes of alcohol were added to one volume of the original fluid, and mixed with a glass rod, a coagulum formed on the rod, and could be thus easily separated, the rest of the fluid being still slightly flocculent, and forming a thick sediment on standing. The coagulum was entirely soluble in water, and the solution thus formed had all the characters of the first fluid, except that it did not coagulate on the addition of nitric acid.

On boiling the original fluid, it became white like albumen; but after adding acetic acid, there was not the same flocculent precipitate as in ordinary albumen. The substance then differed from albumen in the solubility in water of its alcoholic precipitate, also in its non-precipitability with acetic acid and ferrocyanide of potassium. Here it differed also from paralbumen. It differed from mucus in not forming a precipitate with acetic acid, and agreed with it in forming one with alcohol and the mineral acids. It might, Scherer suggested, be called metalbumen, and is, perhaps, an intermediary step between albumen and mucus.

In comparing Scherer's observations with those of Dr. Rees, one is struck with the difference in the amount of albumen described by each as existing in the fluids which they examined. Every one who is familiar with ovarian cysts knows that they have the most varied contents, often owing to slight causes, such as the rupture of a blood-vessel, the supervention of inflammation, &c. The great differences, however, between the fluids examined by Dr. Rees and those examined by Scherer seem to point to something more than this, and rather to indicate that the fluids were secreted in the two cases by essentially different secreting surfaces.

In the paper already alluded to, Dr. Wilson Fox has given the results of his chemical examination of ovarian fluids. They very closely resemble those arrived at by Scherer, the chief difference being that Dr. Fox was unable to obtain a precipitate on the addition of bichloride of mercury.

OVARIAN GESTATION.

In the foregoing very imperfect sketch of some of the opinions held by different authors as to the origin of ovarian disease, no notice whatever has been taken of the subject of ovarian gestation, and little has been said as to the occurrence of isolated fœtal structures in the substance of the ovary. Haller found it possible to produce artificially an extra-uterine gestation, by tying the corona of the womb of a mammalian animal three days after conception. The result of this operation was that two fœtuses were discoverd in the tube between the uterus and the ovary. 'Jan. 6, 1669. M. Benoit Vassal, chirurgeon at Paris, opening the body of a woman, thirty-two years of age, of a sanguine constitution and a masculine port, found two matrixes.' (Phil. Trans., No. 48, p. 969.) Eleven children had been born at full time from one of the wombs, but 'they were at last followed by a brother, yet a fœtus that was conceived in an adjunct uterus, in a place so little capable of distension, that seeking enlargement, after it had caused to the mother, for two months and a half, grievous symptoms, did at last, being of age of about three or four months, break prison, and found its grave in that of its mother, by a very great effusion of blood in the whole capacity of her abdomen.' A drawing accompanies this description, and from it, it is very evident, that the fœtus was developed in the right Fallopian tube, the dilated portion of which is described as the second uterus. From these and similar facts, the physiologists of the seventeeth century concluded that the old idea of conception always taking place in the womb was erroneous, and that it was probably the ovary which was its true seat. In the 'Philosophical Transactions' (Lowthorp, iii. 217), up to the year 1700, M. de S. Maurice relates a case of ovarian gestation. The woman had died with symptoms of internal hæmorrhage, and on opening the body a mass of clot was found in the peritoneum, and a little male fœtus, 'about the bigness of a thumb.' The uterus and Fallopian tubes were perfectly normal; but M. de la Chere, who examined the body, 'was amazed when he found the right testicle torn long ways, through the middle, on the side that did not touch the tube, and all its cavity full of clotted blood.' He concluded that the embryo was developed in this sac, and that the case was, therefore, one of ovarian gestation, and he adds, 'I do not think that any person hitherto has been able to show that the conception is made in the testicle, or ovarium, as it seems to me that the fact which I have now related manifestly demonstrates.' Cases of ovarian gestation have, from time to time, been made public. In the present century, Cruveilhier (Anat. Pathol., livr. xxxvi., pl. vi.) brought forward a case where the skeleton of a young fœtus was found hanging to a sac supposed to be the remains of the right ovary, and the place in which the fœtus was developed. Dr. Granville published 'An Undisputed Case of Purely Ovarian Fœtiferous Ovum,' and Dr. Campbell, in his 'Memoir on Extra-uterine Gestation,' referred to a case recorded in the 'Transactions of the College of Physicians' (vol. vi., p. 414), which he supposed to be indubitably one of ovarian gestation.

In the year 1825, belief in ovarian gestation received a sudden shock. Velpeau had laid four cases of the kind before the Philomathic Society. Some doubts were raised as to their nature, and on a careful examination being made, three of the fœtal sacs were found to be unquestionably unconnected with the ovary, while the fourth appeared to have been developed between the peritoneum and the tunica albuginea. MM. Geoffroy St. Hilaire, Paudret, Allen Thomson, Mayer, Fink, and Schwabe, have each denied the possibility of ovarian gestation.

In the article 'Uterus and its Appendages,' in the 'Cyclopædia of Anatomy and Physiology,' Dr. Arthur Farre goes very fully into the subject.

Dr. Farre has had the opportunity of examining Dr. Granville's case, and has come to the conclusion that it was neither more nor less than an ordinary ovarian cyst. 'The little slender depending fragment supposed to be a rudimental umbilical cord, and very faithfully represented by Dr. Granville in p. viii. of the work quoted in the text, proved to be a narrow flap of the same cyst-wall which had been left hanging from the edge of the sac where a portion had evidently been originally cut away in order more fully to display the preparation (the sharp edge left here by the knife or scissors being very distinctly seen). Upon transverse section of this fragment no trace of umbilical vessels could be found in it.' (Op. cit., p. 589.) Dr. Farre has examined other cases of supposed ovarian gestation, and always with the result of finding that he could not confirm the diagnosis. He speaks on the great difficulties in the way. When a large cyst has already contracted numerous adhesions it is impossible to say whence it originally sprang. The parts become so interwoven and altered by inflammation that they cannot be distinguished. If we want to determine the question of the existence of ovarian gestation, we must examine those instances in which the fœtus and its containing sac are small and non-adherent. Such cases have been examined and described but not with sufficient detail and minuteness. The blood-vessels have never been injected in order to show the connection between the fœtal and maternal parts, and no careful microscopical examination of the tissues has been made. Dr. Farre does not deny the possibility of a seminal filament entering the Graafian follicle, but he denies that any case of ovarian gestation has ever been satisfactorily proved. In speaking of ovarian gestation, Cazeau (*Sur l'Accouchement*, p. 240) refers to an observation by Boehmer which he thinks to be indisputable proof of its occurrence. Like Boehmer he recognises two varieties of ovarian gestation, internal and external. In the first case, the ovum has been developed within the coverings of the ovary; in the second, 'the ovum developes itself partly in the abdomen, partly in the thickness of the ovary.' This variety is distinct from the tubo-ovarian where the sac is formed partially by the ovary, partially by the distended pavilion. As to this latter form, indeed, few authors dispute its existence. We have seen that the cohesion of the pavilion with the ruptured follicle may result in a simple cyst, we now see that if the ovum have been impregnated, it may, instead of dying, go on to the formation of a fœtus in that locality. The question naturally arises, 'Does it always die when not impregnated?' To that question, unfortunately, it is as yet difficult to reply.

In 1859, Willigh (*Prager Vierteljahrschr. f. Pract. Heilkunde*, 16ter Jahrgang, Bd. iii. S. 79) published a case which was tolerably generally received in Germany as one of ovarian gestation, and, as far as we are aware, has never been refuted. Whether this be true or not, the desirableness of further investigation is self-apparent; for in the present state of our knowledge as to the mode and place of conception we can neither pronounce on the possibility or impossibility of this variety of gestation.*

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* On dermoid cysts, see Lawrence, *Med. Gazette*, 1838, vol. xxi. p. 471; Delpech, *Observat. de Pilimiction*, *Clinique Chir. de Montpellier*, tom. ii. p. 521, Paris, 1828; Marschell-Paul, *Archives Générales de Médecine*, tom. xvii. p. 282; Larrey, *Kyste-pileux de l'Ovaire*, *Archives Gén. de Médecine*, 1842, p. 510; Hamelin, *Bulletin de la Soc. de l'Ecole M.*, tom. iv. p. 58, 1808; Phillips, *Med. Trans.*, vol. ii. p. 427;

DERMOID CYSTS.

Whatever may be the truth about ovarian gestation, there can be no doubt that fœtal structures, such as skin, teeth, hair, and bone, are occasionally found in ovarian cysts. Blumenbach was of opinion that these structures were produced by the nisus formativus without previous copulation. Coley and Meckel said that they resulted from incomplete fecundation with the exception of the hair cysts, which they supposed to be due to unnatural excitement (*lucina sine concubito*). Haller looked upon these products as the débris of a well-formed fœtus. Velpeau holds or held nearly the same opinion. Cruveilhier says, that in the immense majority of cases these pilous cysts are the evidences of extra-uterine fœtation, but when they occur in virgins they are monstrosities, by inclusion. Another school of pathologists, struck with the occurrence of pilous cysts in other parts of the body, where they are met with in close relation to the epidermis, have pointed out that the contents of those so-called pilous cysts are all of an epidermic nature, and have insisted on the fact that teeth and brain substance are really to be regarded as epidermic products.

In the year 1850, Dr. Steinlin of Zurich published, in Henk and Pfeufer's '*Zeitschrift*,' a paper upon fat cysts in the ovaries, in which he carefully described his observations on the subject, and gave an opinion which to the present day is quoted as the most advanced on the point. Dr. Steinlin had the opportunity of examining the ovary of a woman who had died of pulmonary consumption, after having had a purulent ovarian cyst tapped fourteen times. The whole of the right ovary consisted of many cysts of various sizes, and, with the exception of one large cyst, full of pus, they were all fat cysts. The largest were three to four inches in diameter, the smallest about the size of a hemp-seed. The contents of the cyst were

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Delarivière, *Journ. de Med. et de Chirurg. de Vaudermonde*, tom. x. p. 516, l'an 1759; Lowthorp's *Abridgment of Philosophical Transactions*, vol. iii.; Wagner, *Archiv. f. Phys. Hielkunde*; Lebert, *Beobacht. u. Klin. Bemerk. über die Dermoid Cysten*, Prag, *Viertljahrschr.*, 1858, Bd. iv. S. 25; Steinlein, Henk u. Pfeufer, *Zeitschr. f. Ration. Med.*, Bd. ix. S. 145; *Kohlrausch, Müller's Archiv.*, 1843-44, &c.

adipose, but the fat was in many of them mixed with a certain quantity of hair, most of which was twisted into balls. When the cysts were emptied, it was seen that their lining membrane was for the most part polished and shining, but that sprinkled over it were small dull-looking spots, from the midst of which rose little warty excrescences covered with hair. In some of the spots there were no warty excrescences; but teeth and pieces of bone were found beneath their surface. On carefully examining the structure of the cysts it was found that their wall might be split up into four layers, the outer of which was of loose areolar tissue; the second consisted of fibres, some reticulated, but most of them arranged in parallel bundles; the third was of elastic tissue, and the lining membrane was tesselated epithelium. Where the lining of the cyst preserved its polished appearance, the epithelial cells were round and regularly arranged, just as in new normal epithelium; but over the dull spots, the cells were flattened and approached in character to the scales of the epidermis. The same scaly cells covered the warty excrescences. On denuding those excrescences of their epithelium a structure was bared, similar in every respect to the corium exposed by means of a blister. Microscopical examination showed that this structure did not only resemble the true skin in general appearance, but also in histological character. It contained nervous papillæ, hair bulbs, sebaceous follicles, and sweat glands; and these were not confined to the excrescences, but were distributed all over the opaque dull-looking spots. Steinlin naturally concludes that the contents of the cyst were merely the retained secretions of the skin glands, that the fat collected just as the vernix caseosa collects, because the follicles keep secreting it, and that the hairs, being deciduous, become rolled into balls and mixed with the tallow, and perhaps some secretion from the sweat glands. According to Steinlin the first trace of a fat cyst in the ovary is found as a little fleshy-looking tubercle about the size of a hemp-seed, in the site of a Graafian follicle, and contained within a sac, from which it can with difficulty be extracted, and which Steinlin looks upon as the former sac of the Graafian follicle. After some time the little tubercle separates itself from its investing sac, except at one point, at which it still remains attached to it by a broad pedicle. At this point loops of vessels enter and are distributed over the little mass, the sac remaining still closely applied to it. Soon, however, the sac becomes distended by a layer of fat, the little tubercle hangs into its cavity just like a polyp; and if we examine its structure we find that sebaceous follicles have already made their appearance. The sac gradually increases in size, other little tubercles appear in it, the number of glands is increased, and of course their secretion is increased in like ratio. The teeth found in these cyst are usually tricuspids, their minute anatomy is identical with that of teeth produced in the ordinary way. Dr. Steinlin concludes that these cysts are to be looked upon as entirely analogous to skin cysts as occurring elsewhere. True skin is in someway produced in the ovary, and the cyst is formed by the product of that skin. It seems almost astonishing that Steinlin, after having so well observed and so well described, should have arrived at the conclusion at which he did arrive. He tells us that some authors have asserted that the production of fat, hair, &c., is the result of extra-uterine pregnancy; but that the idea must be false, because such cysts are found before puberty. He has a difficulty in accounting for the presence of bone, but fortunately remembers that the crustacea have external skeletons derived from the epidermis, and says the bone must be of that description. Had Steinlin carried his research a little further he would have found that the bone was true bone, not thickened epidermis with calcareous deposit. He might, like Virchow, have discovered true striated muscular fibres, which no one would for a moment attribute to the epidermis; and, probably, he would have at length confessed that the old theory of the dermis, &c., being developed from the ovum is after all the most satisfactory one.

It is worth enquiring, whether subcutaneous dermoid cysts do, in their progress, history, and symptoms, agree with dermoid cysts of the ovary. We shall be able to show that they are two entirely distinct affections, having an apparent but no real analogy to each other.

Subcutaneous dermoid cysts are not very rare. Schuh extirpated such a cyst in five cases from the upper eyelid; and Lebert collected seventeen cases, in addition to four which he had observed for himself. Subcutaneous dermoid cysts are always congenital; they grow very slowly, and rarely attain a size greater than that of a hazel-nut. Their most favourite site is the head; the upper eyelids and the root of the nose being the exact spot in which they are most frequently to be found. Usually they do not adhere to the skin which covers them, but if developed over a bone are firmly attached to it. If, now, we compare this description with that of a so-called dermoid cyst of the ovary, we find that there is, indeed, little correspondence between them. Without being able to state the exact numerical relation, it may be asserted, without fear of contradiction, that dermoid cysts of the ovary are of far more frequent occurrence than dermoid cysts anywhere else. Instead of being invariably congenital as the subcutaneous dermoid cysts are, skin cysts of the ovary occur pretty nearly at the same ages as other ovarian cysts are found to do. Thus, out of fifty-nine cases mentioned by Lebert—

1	occurred	under	20			years.
8	occurred	between	10	and	15	years.
3	,,	from	15	to	20	,,
15	,,	,,	20	,,	30	,,
12	,,	,,	30	,,	40	,,
13	,,	,,	40	,,	50	,,
7	,,	after	50			,,

It might be objected that the ages mentioned are only the ages at which the tumors proved fatal, and that they certainly must have been in existence for some time previous. Such an objection certainly ought to have some weight, but it is scarcely probable that a tumor should have been congenital and remained latent up to the age of fifty. Such an objection might be equally urged of any variety of ovarian cyst. Subcutaneous dermoid cysts are found rather oftener in men than in women. It is needless to observe that the dermoid cysts we are at present considering can only occur in the female. Instead of growing very slowly, and rarely attaining a size larger than a hazel-nut, skin cysts may prove rapidly fatal, or may, by blocking up the pelvis, make delivery impossible. They are very prone to inflammation; they may ulcerate through into the bladder, rectum, or peritoneum; they may even, by eating through the abdominal wall, get rid of their contents on the surface. Subcutaneous dermoid cysts are usually single. We cannot at this moment call to mind a case where more than one was found on one patient. On the other hand, a single ovary may contain several skin cysts, and it is not rare to find such cysts in both of the ovaries at once. It is not for us to attempt to explain the occurrence of a subcutaneous dermoid cyst. To our present enquiry it is indifferent whether they are produced by projection inwards of the corium or in some other way. Our object at present is to show that those true epidermoid growths, those sacs in which nothing but epithelial formations are found, those bags of skin which are always in the immediate neighbourhood of true skin, are essentially different and distinct from the variety of ovarian tumors, in which skin, teeth, hair, and bone are contained. There is one other variety of dermoid cyst which may be described, as, although very rare, it has served to confuse the subject. We mean cases of monstrosity by inclusion. It has undoubtedly occurred that one embryo has been developed up to a certain stage within another embryo. Instances of such occurrences may be seen in many of our museums. The development usually proceeds so far that there is no mistake possible; it is evidently a fœtus within a fœtus. Occasionally, however, it would appear that the included embryo dies at a very early period, and then nothing may remain but a small quantity of osseous tissue or a few teeth. Undoubtedly those cases are rare, but it is among them that we would class the great majority of instances where bone and other highly organised tissues are found in sacs unconnected with the female generative organs.

It has been already said that dermoid cysts of the ovary are very prone to ulcerate into surrounding cavities. Cases of pilimiction have been recorded by Delpech, Larrey, Hamelin, and others. Marschell Paul relates a case where a piece of bone was passed from the bladder. In some of these cases deception may have been practised, but in many of them it was shown by dissection that an ovarian cyst had become adherent to, and ulcerated into, the bladder.

Fabricius, Hildanus, Samson, Birch, and others, have described dermoid cysts as found in the gravid uterus, and it has been surmised that they were ovarian, and had ulcerated through the walls of the womb. Even Klob (*op. cit.* p. 368) seems to take this view.

One of the earliest cases of the kind is related by Dr Tyson, in the 'Philosophical Transactions,' previous to 1700 (Lowthorp, p. 226). There is an engraving given of the cyst, which 'was of the thickness of the scrotum, and filled with a liquid slimy matter.' To it were attached teeth and bone. Dr. Tyson was well acquainted with dermoid cysts of the ovary. In a previous communication he had described three of these cysts which he had himself discovered, and he was therefore well qualified to give an opinion on the mode of origin of the growth. We quote his own words:—'What most I can parallel this monstrous body with are those instances of teeth, bones, and hair, met with in the ovaria of women by Dr. Sampson and myself; but our present instance differs from them, in that this was in the womb and firmly adhering to it, the others in the ovarium. In this the hair was on the outside of the cyst and rooted into its tunicle; in the other it was contained within it. But, as the child, which was perfectly formed, and with much difficulty at last brought from this woman, I doubt not at first being included in the egg, descended from the ovarium, so likewise this *subventaneous egg*, I question not, might be transmitted from the same place; and nature, which is never idle, being disappointed of forming in this a perfect fœtus, made the best of what the matter would afford, and might produce these teeth, bones, and hair which may be reckoned as *animal vegetables*.'

The following case is described by Wagner:—

Dr. Kollman was sent for to attend a woman in her third labour. He found the head presenting, and as it made no progress for several hours after the completion of the first stage of labour, he put on forceps and delivered. After taking off the forceps, Dr. K. found behind the fœtal head a fluctuating tumor, the size of a man's fist, with a smooth surface and containing several hard lumps in its substance. The tumor projected about eight inches from the vulva, and ended in a pedicle about two finger breadths in thickness, whose insertion was not to be reached. After the placenta was removed, the tumor remained in *statu quo*. Professor Franke was sent for, and he tied a ligature round the pedicle, and then cut it across. On examining the tumor it was found to be a sac full of a milky, fatty fluid, mixed with balls of fat and hair.

Thirty-four hours after the operation nothing was to be felt of the stump, it had retired within the uterus. Next day, the patient complained of pain in the left thigh. Eight days afterwards, while straining at stool, the stump came through the os, and lay as deeply as it had done at the time of operation. Slight traction caused pain in the left thigh. Three or four days later, the pedicle came away. It appeared to be fibrous, but nothing could be made out as to its seat of insertion. The woman became again pregnant three years later.

In none of the previous cases was the supposititious disease of the ovary demonstrated by post-mortem inspection. In Kollman's case, indeed, the continued good health of the patient, and subsequent conception, rendered it very improbable that grave ovarian disease could have been present, and few on reading it over would have any doubt as to the tumor being a (so-called) blighted ovum. Whether that ovum had been partially impregnated or not, we need not enquire. We have shown, then, that from an ovum may be developed a dermoid cyst differing in little or no respect from a dermoid cyst of the ovary. We have shown, further, that the dermoid cyst of the ovary differs essentially from any dermoid cyst except that produced from an ovum, and we think that we may safely conclude, that *every dermoid cyst of the ovary is an ovum which has undergone a certain amount of development; that it is a perverted attempt at parthenogenesis.*

DESCRIPTION OF A DERMOID OVARIAN CYST.

Ovarian cysts containing dermoid and other highly organised structures are comparatively rare; but through the kindness of Mr. Spencer Wells, I have been able to examine one which he removed by ovariotomy. The case was that of a young German lady, undoubtedly a virgin. She recovered from the operation very rapidly.

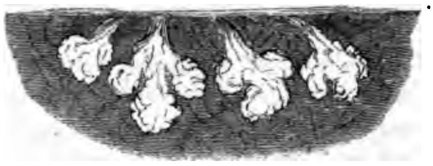
A spherical cyst, which, when distended, held fourteen pints of fluid, and had a diameter of nine inches. There was nothing peculiar in the appearance of the external surface of the tumor. It was, as usual, covered with peritoneum, the Fallopian tube and part of the broad ligament remaining attached; and at that part of the superficies of the tumor which had been in contact with the anterior abdominal wall, traces of inflammatory adhesion and roughened deposits of lymph were observable. The whole of the right hemisphere of the tumor was flaccid, being evidently composed of one or more large cysts, from which the fluid had been evacuated; the left hemisphere was on the contrary more or less solid. It gave the sensation as if it were composed for the most part of fatty tissue, but here and there were felt plates of a bony hardness. These plates appeared to be tolerably superficial. They varied in length from half an inch to three inches: their breadth was about half an inch; their thickness did not apparently exceed that of good writing paper.

On making a longitudinal section, the tumor was found to be made up of two cysts which occupied its right hemisphere, and of a more solid portion which was to the left side. The wall which separated the two cysts, the one from the other, was one to two inches thick, and formed of the same material as the solid portion of the tumor. The two cysts might be described as the upper and the lower. The lower cyst was of an oblong shape, and about as large as the head of a child six years of age. Three-fourths of its wall had an average thickness of one-fifth to a quarter of an inch, and presented to the naked eye all the appearances observed in the wall of an ordinary ovarian cyst, being capable of being split up into different layers, and being well supplied with vessels. The outer layer was peritoneal, and the inner lining mucoid. The microscopical examination showed that the bulk of the wall was composed of ovarian tissue (glandular growths of Dr. Fox). The lining membrane was about one-eighth of an inch thick, brownish, and covered with tesselated epithelium. It lined the greater part of the cyst, but was deficient at one spot, where it appeared to have been rubbed off. At the point where the cyst wall was thinnest no ovarian tissue was perceptible. At one point quite unconnected with the solid mass a fibrous band of the diameter of a crow-quill sprang from the wall of the cyst, and traversing the cyst like a cord, went to be inserted into the opposite wall, a distance of four inches. This band appeared to be completely invested by the lining membrane of the cyst. The little band was vascular, but not tubular. After scraping away the lining membrane of the large cyst there was seen a fibrous network similar to that so frequently met with in the walls of ordinary ovarian cysts, the interstices having the appearance of having formerly been small cysts. One of the loculi actually did contain fluid, and, without doubt, had further search been made other such loculi would have been found. The loculus referred to was of the size of a hazel-nut, but considerably flattened. On incising it, it was found to contain a gelatinous matter, which was colourless and transparent, except at one point where there was a white streak a quarter of an inch long, and one to two lines broad. It was difficult to estimate the thickness of this streak as it lay on the glass upon which it had been evacuated. It was probably about half a line thick, except at one end, which was twice that thickness.

Microscopically, large cells, some of them $\frac{1}{100}$ of a line in diameter were seen, mingled with pigment.

Not very far from the little cyst last described, there projected into the large central cyst a somewhat conical process, about an inch long, and as thick as the middle finger. It was white, shining, and hard. On cutting into it, it was found to be filled with a matter very similar to the vernix caseosa, and evidently consisting for the most part of fat. The inner lining of the cyst appeared to be formed of true skin.

Fig. 1.



SECTION OF SKIN FROM CYST OF STEINLIN, SHOWING SEBACEOUS FOLLICLES.

A careful examination was made of the nature of the connection of this cutaneous cyst with the surrounding structures.

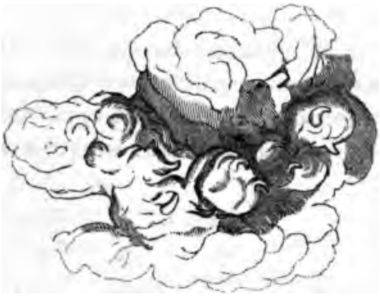
It appeared to be contained in a fibrous capsule, the two sides of which met and formed a cord on each side. The cord again dilated at intervals to enclose other cysts, some of which were transparent and full of gluey fluid. It thus seemed that the dermoid cyst was in the same position as other secondary cysts of the ovary. On carefully cutting away the dermoid cyst from the surrounding structures and inverting it, the skin surface was well displayed. It differed in no respect from true skin, and was plentifully covered with soft silky down. Under the microscope, papillæ were distinctly seen as well as sebaceous follicles, hair follicles, and perspiratory glands. The shape of the cyst was not quite regular, for at that part of it which had formerly been imbedded in the wall of the large central cyst was to be seen a little cul-de-sac about quarter of an inch long, and half as wide.

One of the hard plates already described as developed in the walls of the tumor, was cut down upon from the external surface. The plate had no very distinct capsule, but it was intimately connected with fibrous tissue. At one end of the plate was an oval mass rather larger than an orange-seed, with a reddish chocolate colour, and the consistence of cartilage. It appeared, indeed, to be a little mass of cartilage. This mass was like the hard plate surrounded by fibrous tissue, but its capsule could only be stripped off in shreds. The tissue all round had much the same microscopic character as the walls of an ordinary ovarian cyst, i.e. it was fibrous, containing here and there little cavities lined with epithelium.

Some of the cavities were invisible to the naked eye; others were as large as a split-pea; a few were as large as a gooseberry. These latter, when cut into, were found to be filled with clear gelatinous fluid.

On making sections through different parts of the tumor, numerous little nodules of reddish coloured cartilage were found. They were examined both by Mr. Couper, of the London Hospital, and by myself, and there was no doubt that they consisted of young fast-growing hyaline cartilage. At one part there projected into the cystic cavity a number of bags, mostly of about the size of a small hazel-nut. They were of a dull white colour, and varying consistence. Their shape varied much. Some of them were round or oval; others had a little horn projecting on one side; while others again were all horns together. An idea of their appearance may be gathered from the accompanying engraving sketched from the specimen.

Fig. 2.



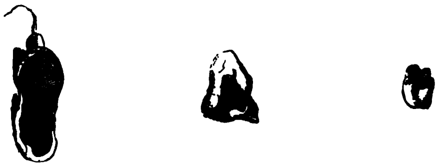
SKIN CYSTS, WITH PROJECTING HORNS.

On scraping away the lardaceous deposit which covered these bags, a number of light silky hairs were found to spring from their *external* surface.

A longitudinal section was made of one of the bags; and it appeared that the little bag whose walls were composed of true skin, was divided into two by a transverse septum continuous with its outer wall.

In the inferior division was a molar tooth. The contents of the upper division were not lardaceous, but consisted of loose cellular tissue, some of the cells being filled with oil. The lining membrane of the large original cyst has already been described as 'mucoid.' To the unassisted eye it had all the appearance of the lining membrane of an ordinary ovarian cyst, but on examining with a simple lens, a large number of shining spots, just too small for the unassisted eye, were discovered. On

Fig. 3.



SECTIONS SHOWING TOOTH SAC.

examining sections at these points with the microscope, the rudiments of sebaceous follicles were found in them, in the form of flask-like bodies, $\frac{1}{300}$ of an inch in length.

Further, rudiments of perspiratory glands were seen in the form of solid aggregations of nucleated cells, ending in a club shape.

Perhaps the clearest idea will be gained of the structure of the cyst by the accompanying diagram, which accurately represents the appearances observed on making a section through the thick part of the cyst wall at a part where a bony plate was felt.

Fig. 4.

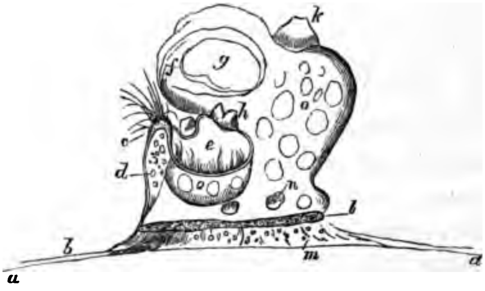


DIAGRAM ILLUSTRATING MODE OF FORMATION OF SECONDARY SKIN CYSTS.

a. Tunica albuginea with peritoneum.
b. Lining of cyst, provided here with stratified columnar epithelium.
c. Lining membrane becoming true skin, and sending projections inwards.
d. Layer of true adipose tissue.
e. Skin cyst of Steinlin, originally full of sebaceous matter. True skin lines the cyst.
f. Layer of imperfect skin enclosing (*g*) fat.
h. A molar, pulp towards (*g*).
k. A tooth.
l. Plate of true bone connected to the tunica albuginea by (*m*) a fibrous layer pierced with small holes just visible to the naked eye.
n. Orifice of a tube running backwards obliquely for quarter of an inch, and opening into the general cystic cavity. It was lined with scaly epithelium, which easily rubbed off, and showed a fibrous coat.
o o. Cysts originally full of jelly.

The interesting part about this tumor is, that it contained two varieties of dermoid cysts. In one variety, the hair pointed *outwards* the outer surface was covered with sebaceous matter, and the interior was occupied with adipose or areolar tissue. In the other variety, the hair pointed *inwards*, the outward face was smooth, white, and polished, while the interior of the cyst was full of sebaceous matter. Steinlin has described this latter variety alone, In fig. 4, one of these cysts of Steinlin is seen in the very act of formation, by an inflection of the lining membrane of the large cyst. As those cysts of Steinlin increase in size, they separate themselves more and more from the membrane which produced them, and probably have the power of generating new cysts by budding, as shown in figs. 2 and 3. It is interesting to observe that the teeth in this tumor are formed in tooth sacs precisely as in the embryo. The bony plates were to me an object of very careful scrutiny. It has been asserted that what has been supposed bone in ovarian tumors was nothing but calcified epidermis. In this case there is not the slightest doubt that the plate consisted of true bone. Haversian canals, lacunæ, and canaliculi were all plainly seen, and Dr. Southey, of Bartholomew's, who kindly examined a section of it, gave as his opinion that it was bone formed from fibrous tissues and not from cartilage.

I have only described the lower loculus of this cyst, because the upper one presented identical appearances.

I am inclined to believe that the whole tumor was formed from one or at most two ova. I think the former supposition the more probable. It is not astonishing that most of the structures are formed from the external layer of the blastodermic membrane, because it is this external layer which is at first the most active. It is from it that the amnion and the internal layer of the chorion are formed. And the mode of their formation has many parts in common with the mode of formation of the secondary dermoid cysts. Looking at the similarity in the position of those small dermoid cavities just described, and of secondary cysts in an ordinary ovarian tumor, I cannot help thinking that they must often have a similar origin; that many secondary cysts containing jelly are really derived from an ovum.

CHAPTER V.

SKETCH OF THE MODES OF CYST FORMATION IN THE OVARY.

Dropsy of Graafian follicles.—Faulty evolution of follicles.—Dropsy of follicles combined with thickening of their capsules.—Dropsy of the primary follicles.—Changes in corpora lutea.—Hyperplasia of ovarian tissue.—Fibrous hyperplasia.—Follicular hyperplasia.—Probability of some cysts being due to ovum.—Dendritic growths; their relation to cancer.—Cancer.—Tubercle.—Hydatids.

No parts of the human frame are so liable to cystic degeneration as those immediately connected with the function of generation. In the ovary, in the mamma, in the uterus and Fallopian tubes, in the vagina and in the newly-impregnated ovum, cysts are by no means of infrequent occurrence. Nor are we astonished at such a disposition. Other organs perform their functions regularly, and their nutrition exactly balances the demand upon their powers. The generative system lies habitually dormant, and is suddenly called into the most active play. Its nutrition, instead of being carried on regularly, is marked by sudden alterations. Once every month, the pelvic organs are congested. If everything happens as it ought to do, this congestion relieves itself by the bursting of the blood-vessels, by the occurrence of uterine epistaxis. If from any cause the congestion be insufficient—whether it may be from general poverty of the blood, or from a want of nervous force—then the epistaxis does not take place, and the congestion is apt to remain chronic. If, on the other hand, the congestion be excessive, the slight hæmorrhage fails to relieve it, blood may be extravasated into structures not meant for such a purpose: or should this not occur, still a dangerous impetus may be given to the growth, to the nutrition of the organs implicated.

In the ovary, however, there are other causes at work. The normal function of the ovary is to produce cysts. It is formed, composed entirely of cysts in different stages of development, and containing within them germs which themselves may be converted into secondary cysts. From the very earliest infancy, while still the fœtus is in its mother's womb, these cysts are being formed, becoming perfect and passing away. This series of operations is ever recurring, and ever being modified. The highest stage to which a cyst attains may be a simple globule, or it may be a fœtus and a corpus luteum. It may perish unnoticed, or it may powerfully affect the whole system and end in the production of a new animal.

Between these two extremes there are innumerable stages, innumerable halting-places at which the cyst development may stand still, or may deviate from the physiological course and become altered by such external agencies as pressure and inflammation. Authors have attempted to explain the formation of ovarian cysts as a complicated process the nature of which is unknown. Similar explanations have been given of these cysts which occur in the kidney and in other organs. The whole course of pathology, however, is now tending to a more simple explanation. It has been shown that renal cysts are for the most part nothing but sacculated ducts, that the so-called hydatid mole is merely atresia of the villosities of the chorion, that the proliferous cysts of the mamma are examples of adenoma. The same thing holds good in the ovaries. Adventitious structures are few and far between. There are no adventitious structures peculiar to the ovary. Tubercle or cancer may be developed, hydatids may be found; but these are of comparatively rare occurrence. The great mass of ovarian disease is due to slight errors of nutrition. More serum is poured into a vesicle than is normal. The secretion is retained instead of being got rid of, or is poured into a cavity which was not intended to receive it. Cells go on multiplying *ad infinitum*, and thus produce hyperplastic growths. Changes which normally occur in the contents of vesicles after they have been discharged, take place within the vesicles themselves, either in a perfectly regular series, or slightly modified by their novel situation. Such are the different ways in which ovarian cysts are produced.

Perhaps one of the simplest classifications of ovarian cysts, according to their mode of formation, may be obtained by making use of Virchow's distinctive terms 'Hypertrophy' and 'Hyperplasia.' It is by no means a perfect classification, but it seems to me to be simpler than any other.

All those forms of ovarian disease which could not be got under either of the first two heads I have classed as 'Neoplasms,' or new formations; although, with the exception of hydatids, it is doubtful how far any of them deserve that name.

Proposed Classification of Ovarian Tumors based on the mode of their origin.

I.—Hypertrophy of the ovary.
  (1.) Partial (simple cysts, multiple cysts).
  (2.) General (hypertrophy of primary follicles, as well as of Graafian follicles).
II.—Hyperplasia of the ovary.
  (1.) Fibrous hyperplasia (fibrous degeneration of Kiwisch).
  (2.) Follicular hyperplasia.
  (3.) General hyperplasia.
III.—Neoplasms.
  (1.) Belonging to the ovum.
  (2.) Dendritic.
  (3.) Tubercular.
  (4.) Cancerous.
  (5.) Hydatiginous.

I. The most simple form of ovarian disease is perhaps that which has been best described, and concerning whose origin there is an agreement approaching to unanimity among authors. After having tried all the different theories—the hydatids, the dilated lymphatics, the enlarged veins—writers have come back to the oldest theory of all, and have admitted that the simplest ovarian cyst is an enlarged Graafian follicle.

There can be no doubt about it; the ovum, as has recently been clearly demonstrated, may be found within.

Occasionally, indeed, we are unable to say whether we have to deal with the first stage of a simple cyst, or with a very ripe Graafian follicle.

It is impossible to draw a line between physiology and pathology.

The little cyst may burst and discharge its ovum, or it may enlarge and never burst spontaneously.

In some animals—the calf, for instance—this bladder-like disposition of the ovary is far more apparent than in man. If in the human ovary we were to find the ovisacs as large and numerous in proportion to the stroma as they are in the calf, we should certainly attribute the appearance to disease—to the commencement of what is so often spoken of as 'cystic degeneration.'

The mode in which a Graafian follicle is converted into a pathological cyst is abundantly simple.

Let there be a slight increase in the strength of the Graafian wall, or a slight diminution of the excentric force necessary to burst it, and the follicle immediately becomes a cyst. Its nutrition is now altered; the ovum disappears; the walls become thicker, tougher, and more compact; the diameter of the follicle increases as the serum collects in its cavity. As the cyst enlarges, it presses upon the surrounding parts, and may even cause the absorption of the ovary from which it sprang. More frequently, however, this does not take place. Usually the cyst, before it has attained any great size, has so much overtopped and protruded from the ovarian surface, that it exercises little or no pressure upon it, and the ovary remains attached to the cyst.

It is not, however, very frequently the case that one Graafian follicle alone becomes dropsical while the rest remain healthy. It is more usual for many follicles to enlarge simultaneously, the same causes acting upon all.

The different cysts thus formed meet each other, are pressed together, and adhere. The pressure increases; the partition-wall becomes thin, ulcerates, and throws the cysts into one general cavity. Those cysts which are least acted upon by pressure become the largest, and thus various forms of multilocular tumor are produced.

In this form of ovarian degeneration the disease evidently attacks only those follicles which are ripe, and, consequently, close to the surface of the ovary.

It may happen, however, that two or more follicles may coalesce before they have reached the surface, while they are still deeply imbedded in the interior of the ovary.

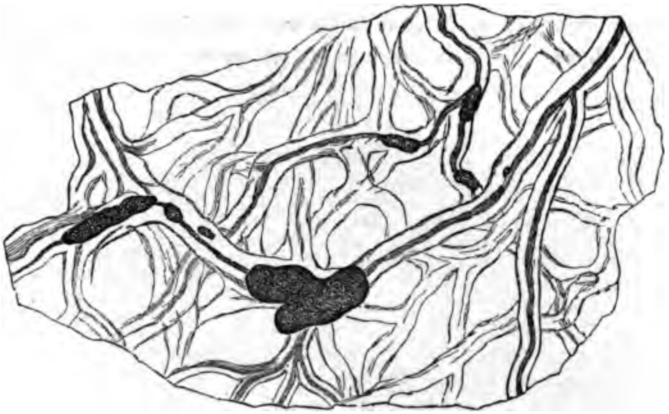
There is thus formed a cavity in the interior of the organ, and this cavity produces a singular effect. The Graafian follicles, as they successively ripen, no longer find it necessary to become more and more superficial. On the contrary, they experience less resistance towards the interior of the ovary, where the cavity exists, and consequently they push towards that point, and finally burst into it.

In this way the cavity gains in size, and as it itself is provided with epithelium and capable of secreting a fluid, it enlarges rapidly and pushes outwards the ovarian tissue on every side: so that at length there is presented to us a structure which at first sight might be mistaken for a simple cyst, but in whose walls may be found *normal Graafian vesicles containing ova.* The great difference between a cyst of the kind last described and a single cyst is, that while the latter is an enlarged Graafian follicle, the former is a space hollowed out in the substance of the ovary by fluid which has been effused into it. It is true that fluid has been derived, for the most part, from Graafian follicles, and that the space may originally have been formed by the coalescence of follicles: still, it may not be so. All that is necessary for the production of such a cyst, is that a cavity should in some way be formed in the middle of the ovary. That might be affected by hæmorrhage into one of the primary follicles, or ulceration, or other inflammatory changes. Naturally it may happen that the simple Graafian dropsy may be combined with the variety of cyst due to altered evolution.

The walls of the cyst are sometimes very vascular, and the cavity may occasionally be found filled with fluid or clotted blood. Fig. 5 is an accurate copy of the appearances observed in one of the cysts removed by Mr. Wells by ovariotomy. The pedicle of the tumor had, I believe, become slightly twisted; and, as a consequence of this, blood had been poured out not only into the large central cavity of the tumor, but also into the smaller loculi. Fig. 5 gives a view of part of the wall of the large cyst as seen from within. The large vessels, in some places ulcerated, and the attempt at occlusion by the formation of clot, are well seen.

The third variety of cysts to which attention may be drawn are those which are characterised by hypertrophy, not only of the Graafian follicles, as in the first case, but also of the fibrous stroma. The fibrous capsules enveloping the follicles become thickened instead of disappearing. These fibrous capsules are, as is well known, mere prolongations inwards of the tunica albuginea; and it is therefore surprising that when the capsules are hypertrophic, the tunica albuginea itself is much thickened and condensed. With such an investment, the Graafian follicles cannot push themselves upwards, so as to project from the surface of the ovary. The tunica albuginea is, however, elastic; and the ovary increases in size, retaining its old shape as long as pressure will allow it, and then adapting itself to the force of circumstances.

Fig. 5.

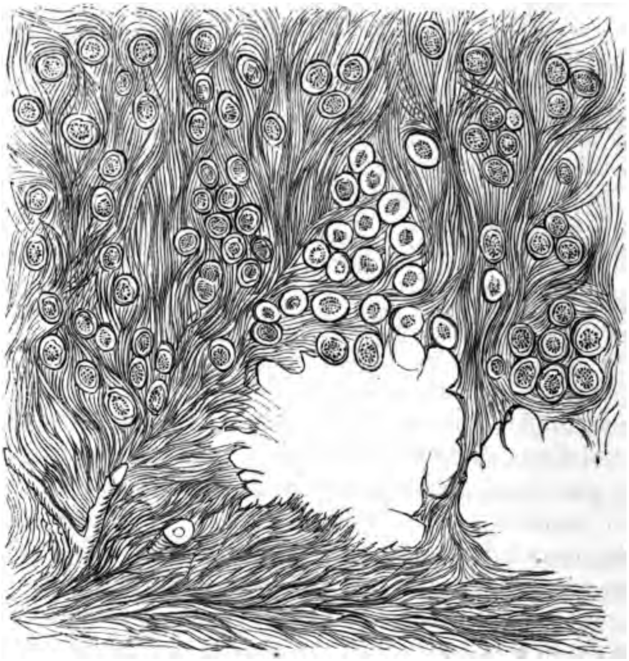


WALL OF OVARIAN CYST, SEEN FROM WITHIN, SHOWING DILATED AND RUPTURED BLOOD-VESSELS.

In cysts of this description, the dividing septa at length give way, and the cavity may even become unilocular; but its walls will be marked with traces of the thick fibrous partitions which at one time existed. The cysts affected are comparatively few, rarely more than twenty, and their pressure suffices to cause the absorption of the primary follicles of the ovary.

There is another variety of ovarian tumor in which *the primary follicles* are the seat of the hypertrophy. Under certain conditions, there appears to be a hypersecretion into the meshes of stroma which enclose the first trace of the Graafian vesicles. The normal contents of the primary vesicle undergo granular degeneration, and the little space enlarges till it might contain a pea. This form of ovarian disease is most frequently associated with some of the others already described; and it might be supposed that it was either a consequence of the more simple degeneration, or that both were due to an altered state of the blood. It is in the variety of tumor at present under consideration that the jelly-like substance known as colloid is most frequently found. Just as in the other cases mentioned, these enlarged stromal meshes may break into each other, and form larger or smaller cavities. It is, indeed, not very rare for the whole of the network to disappear by absorption, and leave the semi-solid contents loose within a fibrous capsule, the altered tunica albuginea. There has, perhaps, been more dis-

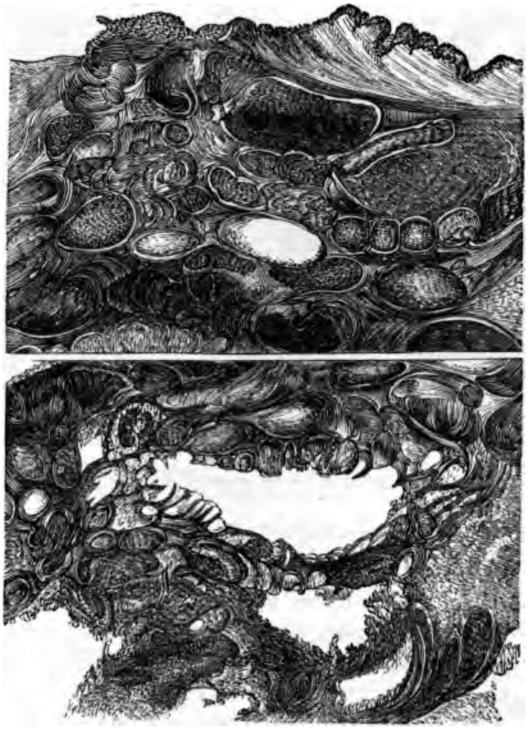
Fig. 6.



HEALTHY PRIMARY FOLLICLES (AFTER GROHE).

pute with reference to this kind of tumor than with reference to any other. Probably the discrepancy among authors is in some measure due to the comparatively faulty state of our knowledge, till within the last few years, of the normal anatomy of the ovary, and especially of its so-called stroma. If we compare fig. 6, copied from Grohe, which is a drawing of the healthy ovary, with fig. 7, which is an accurate copy of the microscopical appearance of the kind of cysts we are considering, we cannot fail to be struck with their great similarity. In fig. 7 we see all the various stages of the affection. We can trace the fibres of the stroma continuous with those of the albuginea. We see them separating to enclose spaces of varying sizes. We observe the effect of mutual compression, causing elongation of the spaces, forcing them into close contact with

Fig. 7.

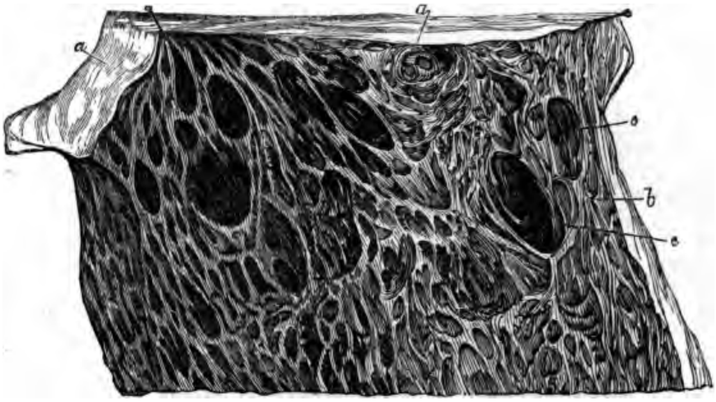


FIRST STAGE OF DROPSY OF PRIMARY FOLLICLES.

each other, or permitting free communication between them, or causing many small ones to break into a large one, and thus form a cavity of considerable size.

Nothing can give a better idea of the mode of formation of not only the colloid, but also of many other forms of ovarian tumor, than the illustration brought forward by Virchow. A man died after having for long suffered from diarrhœa. A post-mortem examination was made, and it was found that part of the rectum and colon was the seat of jelly-like degeneration. The appearances were exactly those of ovarian colloid. Transparent trembling jelly was partitioned off into prisms, or small polygonal columns, by whitish lines made up of granular corpuscles and fat-globules.

Fig. 8.



DROPSY OF THE PRIMARY FOLLICLES.

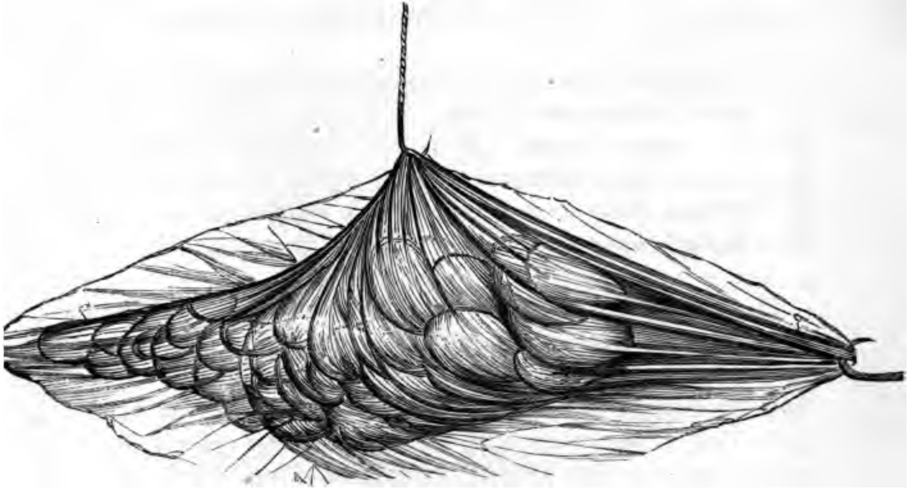
The investing membrane, the tunica albuginea (*a*), is seen partially in profile; continuous with it, the fibrous trabeculæ (*b*) enclose small spaces (*c*), originally filled with mucoid fluid.

The steps of this morbid process were easily followed. Mucus collected in the tubular glands of the mucous membrane of the colon. It found no vent, and consequently the glands became distended and pressed against each other. The effect of this pressure was, that their partitions were absorbed, and soon nothing was left to separate the glands which had been contiguous except a little altered epithelium, which in section had the appearance of a whitish line.

It does not invariably happen that the contents of these little cysts are jelly-like: occasionally the fluid which they contain is very thin and watery.

Figs. 8 and 9 are examples of different varieties of this form of ovarian tumor. The engravings were sketched from preparations which I made of tumors remarked by Mr. Wells, and described by me in the first volume of Mr. Wells's book on Diseases of the Ovaries. In each case it will be observed that the fibrous dissepiments of the loculi spring directly from the tunica albuginea. The sole difference between the two specimens is, that in fig. 8 the loculi are less distended than in fig. 9.

Fig. 9.



A MORE ADVANCED STAGE OF DROPSY OF THE PRIMARY FOLLICLES.

a. The tunica albuginæ seen from the inside.
b b. The fibrous trabeculæ enclosing bladder-like spaces.

It is well known that excessive hæmorrhage may occur into the cavity of a corpus luteum. If the foramen through which the ovum escaped be still patent, or but feebly closed, then the blood will force its way out into the cavity of the peritoneum, producing one variety of peri-uterine hæmatocele. If it happen, however, that the foramen is firmly closed, and the blood is confined in the cavity of the corpus luteum itself, the pressure which it exerts destroys the whole gland-structures, and the ovary may be found as a bag, perhaps the size of a hen's egg, full of altered blood. This kind of ovarian tumor probably never reaches any considerable size, and generally terminates by rupture into the peritoneal cavity. Again, the corpus luteum may become distended with serum, and may thus appear as a cyst differing in no respect from a simple Graafian ovary, except in the dirty greyish colour of its wall, in the appearance of a cicatrix at the point of rupture, and in the admixture of its contents with fat-globules, the product of the degeneration of the membrana granulosa.

We know that the pelvic congestion kept up during the continuance of pregnancy has a very marked effect upon the size of a corpus luteum. It is probable that other causes besides pregnancy may act strongly upon the yellow body, and perhaps cause it to exceed in size anything that is met with in the healthy state.

II.—By hyperplasia of the ovary, is meant an increase in the number of its elementary structures. The fibrous tissues may be formed in excess, constituting fibrous hyperplasia; or the follicles may be formed in excess, producing follicular hyperplasia; or all the component structures of the ovary may be reproduced, and form general hyperplasia.

General or complete hyperplasia, the hypertrophy of most authors, is not of very infrequent occurrence in the ovary. It is not uncommon to find in the walls of cysts otherwise produced, masses of tissue which can in no way be distinguished from normal ovarian tissue. This is true adenoma.

It occasionally occurs alone. It is not very rare to meet with human ovaries, otherwise apparently normal, which are two or even three times as large as is usually considered normal.

It is very problematical, however, whether true adenoma of the ovary ever, when uncomplicated, attains a size which would admit cysts being diagnosed during life as an ovarian tumor, Ovarian hyperplasia is most frequently combined with some form of cyst formation, and is probably secondary to that cyst formation.

It is astonishing how much of the ovary is occasionally left untouched by disease. There may be an enormous ovarian tumor, weighing 40 or 50 lbs., and yet the rest of the ovary may remain little implicated. Occasionally these masses of disease are apparently attached to the healthy ovary by a narrow pedicle an inch or more in length. In such a case, one might be led to suppose that the disease was extra-ovarian; while a careful dissection would have shown that the tunica albuginea was continuous with the sheath of the pedicle, and continuous with the investing membrane of the tumour, and that the pedicle was itself formed of ovarian tissue in which follicles containing ova might be isolated, and that the wall of the tumour most remote from the ovarian attachment might also be exactly similar to that of the normal ovary. In such a case we are bound to conclude that the ovarian substance has increased—that there is true hyperplasia of the ovary, as well as some form of cystic degeneration.

As to *fibrous hyperplasia.* Fibrous degeneration of the ovary is of comparatively rare occurrence. It is rarely that the whole ovary becomes converted into a mass of fibrous tissue; but it is not very uncommon to find originally existing fibrous septa prodigiously thickened. The thickening of this tunica albuginea, which must also be included under this head, has already been mentioned.

By *Follicular Hyperplasia* is meant not that the follicles become abnormally large but that they are abnormally abundant.

My father's researches have sufficiently established the fact, that, in health, follicles are always being developed in the ovary, and always disappearing.

It is probable, however, that under certain morbid conditions an extraordinary impulse is given to follicular development; and this we would characterise as follicular hyperplasia.

Dr. Fox has lately described the multiplication of cysts by a growth of tubular projections from the wall of the ovisac. He thinks the ovisac may send out tubular villosities, just as the chorion does; that these tubules may afterwards, by successive constrictions, become moniliform, and at last a chain of shut sacs. I have never been able to satisfy myself that this process does take place in the ovary; but I have observed many appearances which seemed to confirm Dr. Fox. It is by no means unusual to find in an ovarian tumor a thin-walled cyst, about as large as a hazel-nut, from whose otherwise spherical contour springs a little projection, like a thimble, only much smaller;

perhaps as large as a pea. On cutting into the projection, it is found to be hollow, its cavity communicating with that of its companion. Dr. Fox would regard the little projection as the first stage towards the formation of a new cyst, and he would probably be correct in so regarding it. It must, however, be borne in mind, that the thimble-like cyst may possibly have been a separate cyst, and that it had at length burst into the one beside it.

It is unlikely that ovarian cysts are often formed in the way Dr. Fox supposes; because it is not the way in which Graafian follicles are usually formed; and it seems improbable that nature should have one way of forming Graafian follicles in health, and another totally different way of forming them in disease.

Perhaps the appearances noted are merely the result of pressure. The walls of the follicle are being pushed outwards by accumulating secretion. One point of the outer layers of the wall, which are formed by ovarian stroma, is weaker than the rest (probably because a small vesicle was once there), and the inner layers protrude through this weak part like a hernia. In this way a cul-de-sac may be formed; and if its mouth close, it will of course become a cyst.

This is not, however, a frequent mode of formation of ovarian cysts.

All analogy points to the gradual formation of follicles in the normal manner: that is to say, that the new growths are first to be found as tubules, then as primary follicles, and only finally as Graafian vesicles. They undergo those successive transformations, but they may stop short at any one of them. They may be found in the state of tubules. The tubules may never be cut off into little sacs, and a tumor may result which is almost identical in structure with adenoma of a tubular gland.

Kiwisch described cystic degeneration of an ovarian fibroid just as we know cystic degeneration of a uterine fibrous tumor may take place. Rokitansky has, however, shown us that the so-called cystic degeneration in the uterus is due to prolongation of the uterine glands into the fibrous tumor. The same thing may take place in the ovary. The fibrous stroma may hypertrophy; and these tubular glands, these first traces of follicles, may grow into it.

At present it is scarcely possible to say with certainty what is the exact mode of formation of new follicles in healthy or in diseased ovaries. I believe that on one occasion I saw in a normally-sized ovary, whose fellow had been removed by ovariotomy, a system of tubes apparently similar to those described by Pflügel. On the other hand, I can confirm Dr. Fox's description of the appearances represented by glandular growth, his first mode of cystic formation.

It may be objected, that no explanation has yet been given of the occurrence of cysts within cysts, of the true proliferous cyst. A barren cyst may very well simulate a proliferous one. All that is necessary, is for a small cyst to be firmly pressed against a larger one, and to invaginate itself in its walls, becoming covered with the outer wall of the large cyst, just in the same way as the ovary itself is indented with peritoneum. It is, however, probable that secondary cysts are occasionally produced in another manner.

III. It has been shown that all the different structures of the ovary, with one exception, may be the seat of disease. Nothing has yet been said about the ovum; and yet it is most probable that many cases of so-called ovarian cyst are in reality cysts of the ovum.

It is to Rokitansky that we owe the first actual demonstration of the presence of an ovum in an ovarian cyst. In the first volume of the 'Wochenblatt der Zeitschrift der KK. Gesellschaft der Aerzte zu Wien,' Rokitansky describes the appearance observed in the post-mortem examination of a woman, 26 years of age, who died of diseased ovaries. Both ovaries were affected. The tumor on the right side was as large as a child's head, that on the left as large as a man's fist. Both ovaries were composed of a number of cysts as large as a cherry, which for the most part lay closely packed together, here and there became flattened by mutual compression, and occasionally even projected into each other. The surface of the tumors was thus slightly lobulated, and between the protuberances were seen, at intervals, cysts as large as a barleycorn, a pea, or a bean. These latter cysts on being punctured gave exit to a greenish-coloured fluid containing membranous flocculi, and in all of them the ovum was found. In each of them, however, the ovum was softened, very dull-coloured, easily disintegrated. The zona pellucida had for the most part lost its sharp contour, and, except in one case, no germinal vesicle was discoverable.

As far as I am aware, this observation of Rokitansky was never publicly confirmed until July 1864, when the reporter to the 'Medical Times and Gazette' of four cases of ovariotomy performed by Mr. Spencer Wells in the Samaritan Hospital, mentioned that in two of the tumors removed, Dr. Webb and myself had been fortunate enough to discover many ova. The patient from whom the tumors in question were removed was 54 years of age, and had been for some time suffering from double ovarian disease. The tumors were easily extirpated, and the patient recovered.

Each tumor was of the size of the head of a child four years of age. Each contained several large central cavities and a number of smaller ones in the wall of the central cavity, the wall itself never exceeding one inch in thickness. In the 'Medical Times and Gazette' for 6th August, 1864, Mr. Spencer Wells wrote as follows:—

'The two tumors in question were examined directly after their removal by Dr. Ritchie, who pointed out to me in each of them a number of small cysts, which were evidently enlarged Graafian follicles. Knowing the great and long familiarity which Dr. Woodham Webb has had with the ova of various species of animals since his researches in conjunction with Barry, I asked him to examine some of the cysts in order to ascertain whether they did or did not contain ova, knowing that on this point no higher authority could be appealed to. As one friend has suggested that we may have mistaken a *blood-corpuscle* for an ovum, there was evidently some reason for my caution; but I trust that the following note from Dr. Webb will set all such doubts at rest:—

'"Both the tumors you sent me, after their removal from a woman 54 years old were growths in excess of true ovarian structure. The multilocular character was produced by clusters of ovisacs of various sizes. Ova with the other natural contents were to be found in all the small sacs. The fibrous coats of the larger sacs were thickened, and had many other secondary sacs developed in them. The interior was lined with epithelium, which in some instances had by parthenogenetic enlargement and successive buddings of the cells given rise to bunches of grape-like growths, repeated generations of imperfect ova.

'"The whole, then, was nothing more than a reproduction in the human subject of conditions which are natural in some of the lower creatures. I suppose the description in your orthodox pathological terms would be, 'hypertrophy of the ovaries with arrested development of the contents.'"

This letter, coming from a gentleman of Dr. Webb's known experience, is of great interest. Dr. Webb evidently inclines to the belief that the ovum is only an altered epithelium-cell. He also seems to believe that the grape-like growths, those described further down as dendritic growths, are repeated generations of imperfect ova.

I have to acknowledge the obligation which I am under to Dr. Webb, for, until I saw the manner in which he manipulated, I had never been able to isolate an ovum, although certain, from the appearance of the vesicle and of its contained membrana granulosa, that it must be a Graafian follicle.

Since last August, however, I have succeeded in finding ova in some of the loculi of a large number of ovarian cysts. Some of the ova were perfect, with a sharply-defined zona pellucida, a germinal vesicle, and a germinal spot; others were more or less imperfect, many having the appearances mentioned by Rokitansky. I have never found an ovum in a loculus larger than a cherry, and never in a loculus which contained jelly-like contents.

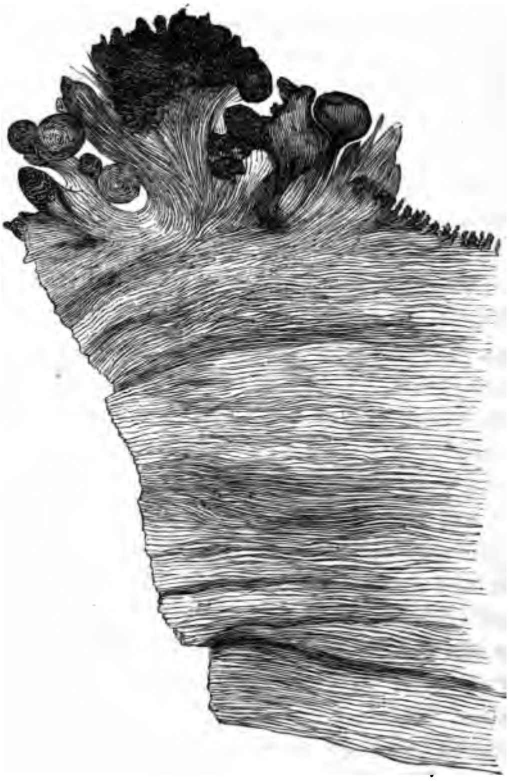
Long before I myself found an ovum, being familiar with the observations of Rokitansky, I was led to believe that in some cases ovaria cysts are actually due to development of the ovum while still in its ovisac; and as the question of priority may at some future time be raised, it may be well to state that this opinion was made public in the 'Medical Times and Gazette' of the 6th August, 1864.

There is every reason to believe, that if from any cause the ovum should be prevented escaping in the normal manner, it may commence its train of wonderful metamorphoses while still in the Graafian follicle. That this should occur, it is not requisite that impregnation should have been effected. Whether the ovum be fertilised or not, it normally undergoes certain wonderful changes. The germinal vesicle and germinal spot disappear; the yolk, by successive cleavings, is converted into the corpus muriformis, the mulberry body becomes hollow, and the cavity thus formed goes on increasing in size until at length it has forced its walls into contact with the yolk-bag, and thus constituted the blastodermic vesicle. Occasionally, on examining ovarian tumors, thin-walled bladders may be enucleated. These bladders have all the characters of Graafian follicles, and there can be little doubt that they are nothing else. However, there is no ovum to be found within them, but, in place, a single small secondary cyst embedded in one part of the wall. Under such circumstances, we are almost justified in concluding that this secondary cyst is nothing but dropsy of the blastodermic vesicle. It would, however, be very strange if the development of the ovum always stopped short at this early stage; and, in fact, we have good proof that such is not the case. The occurrence of true bone, skin, hairs, fat, &c. &c., in ovarian cysts taken from virgins, show how far the development of the ovum may go, how great an effort may be made towards parthenogenenis. We know, however, that the ovum cannot reach this high state of development without passing through many transition stages. And when we study these transition stages, we find that they are peculiarly liable to end in cyst productions. It would not be very surprising were it found that the external layer of the blastodermic membrane is capable of sending out tubular productions similar to the villosities of the chorion. The ovum, when it is in the Graafian vesicle, is at first better off than when in the Fallopian tube. Instead of having only a very limited supply of nutriment—the discus proligerus—the ovum is imbedded in the whole cumulus proligerus. The villosities, when protruded, have no difficulty in procuring nutriment; they have only to force their way to the wall of the Graafian follicle, and they are in the immediate neighbourhood of a large vascular supply. There is nothing improbable in the supposition that a regular amnion may be formed, that the blastodermic membrane may break up into its three layers, and that the primitive trace of the embryo may become apparent. We are almost naturally led as far as this by the comparative frequency of structures originally derived from the external blastodermic layer. Over and over again we are told in books that the contents of these cysts are usually of an epithelial character; that skin, hair, fat, teeth, and cerebral matter are all to be referred to the same group of epithelial structures. Most certainly they are. All the substances mentioned are derived from the external layer of the blastodermic membrane; and their frequent occurrence only shows that that layer keeps its vitality oftener and longer than the other two. When we find bone and true striated muscular fibre, then we have evidence that the middle layer has been active. I am not aware whether there be any evidence of similar activity in the inner, the so-called mucous layer. It is then by no means absurd to suppose, but on the contrary tolerably certain, that up to some point the unimpregnated ovum, while in its ovisac, behaves precisely similarly to the fertile ovum while in the womb. When, however, we take into consideration the circumstances under which it is placed, and the liability which ova have to various forms of degeneration, it certainly appears probable that frequently growth runs riot, and that all manner of singular productions are the consequence.

Now it is by no means extremely rare to find in the wall of a large ovarian cyst a second one, about the size of a moderate apple. Those cysts are usually flattened, rarely much distended with fluid; and within them may be felt a hard substance, in shape like the segment of a sphere, an inch and a half or more in diameter and a quarter of an inch thick. On opening the cyst, we find that the hard feeling is due to the presence of a cake of the size and form mentioned, firmly fixed to one part of the wall of the cyst. The structure of the cake may differ in different cases, but most frequently it is meshed, consisting of layers of fibrous tissue all starting from a common centre, and crossed at intervals by concentric laminæ, also fibrous. The meshes formed are usually large enough to admit a barleycorn, and are filled with a glairy fluid. The occurrence of such structures within cysts having all the appearance of advanced Graafian follicles, would almost *primâ facie* lead us to suspect that they were altered ova; and the idea gains ground when we find that it is utterly impossible to account for such a structure in any other manner.

Dendritic growths spring from the epithelium lining ovarian cysts, from the altered membrana granulosa. They are essentially epithelial in their character; but at a subsequent period the fibrous stroma sends projections into them, and shut cavities may be formed by the accidental cohesion of their branches. The accompanying engraving is a magnified transverse section of the wall of an ovarian cyst. The wall is entirely composed of fibrous tissue, except at its upper margin, where it is epitheliated, and where dendritic growths are in active formation.

Fig. 10.



There is a great deal of doubt as to the nature of these dendritic growths, but on the whole I am inclined to look upon them as a kind of epithelioma having some affinity to, or some tendency to degenerate into, true cancer. The reasons for this belief are, besides the anatomical structure, that I think I have remarked that in those cases where both ovaries were diseased, dendritic formations were found more commonly than was to be expected from their ordinary proportionate frequency. In cases, too, which were undoubtedly cancerous, I have found the cancer-cells arranged dendritically. The steps of formation of a dendritic growth, as far as they can be seen, are as follows: An epithelial cell elongates and projects into the cyst cavity, that is to say, a scale of tesselated epithelium becomes columnar. The columnar epithelium becomes stratified by the continued upward growth of cells. Lateral offshoots are sent out, and these offshoots again subdivide into minute ramifications. A loop of vessels accompanied with fibrous tissue grows upwards from the stroma into the dendritic formation.

Compare this with what was observed in a case of ovarian cancer which Mr. Wells was kind enough to allow me to examine. The structure of the ovarian tumor was to the naked eye much the same as one of the most common forms of ovarian disease, and which has been described in this volume as follicular hypertrophy. The tunica albuginea sent trabeculæ inwards to a honeycomb mass just as in fig. 8. Some of the cells of the honeycomb appeared to be mere slits, but on opening them they were found to be sections of cavities large enough to hold a large bean. The lateral walls of the cavity adhered loosely together; and on separating them, slender transparent threads were observed to run from one wall to the other. It was at first doubtful whether these threads were the remains of a membrane, or whether they were coagulated mucin. On collecting them and examining them with a power of 350 diameters, they were found to be filled with very large cells of every shape, the caudate predominating. The cells were all nucleated. Some of them contained one nucleus, others contained many.

They were filled for the most part with granular contents; although a few of them were clear, and some contained oil-globules. The cells appeared to be in the act of propagating in three different ways:—

(1) By endogenous formation, (2) by fission, and (3) by sprouting.

On making careful sections of these loculi, their walls were found to be made up of fibrous tissue; the fibres being very distinct towards the middle of the thickness of the wall, while, as they approached the internal surface of the cyst-wall, they gradually assumed the appearance of the cancer cells just described. The case was undoubtedly one of cancerous degeneration of the epithelium of an ovarian cyst. In most of the cysts the degeneration was equally diffused all round, and consequently the cyst was distended with epithelium, which appeared to be arranged in concentric layers around a small dark spot, which was ascertained to be the nearly-obliterated cavity of the cyst. In some of the cysts, however, the epithelium was affected only at a single point of the circumference of the cyst; but from this point it spread out in a dendritic manner until it filled the cyst. The cells of this dendritic mass had all the cancerous characteristics shown by the others, and yet to the naked eye the growth could not be distinguished from an ordinary dendritic formation.

The whole question of malignant disease of the ovaries is one of great interest. Even the case just sketched opens up a very curious problem. Did the cancer cachexia which lurked in the patient attack a previously existing ovarian tumor, or was this entire ovarian disease to be attributed to the cancer? It is certainly possible that the woman from whose body the tumor referred to was removed after death, had a tendency to cancer, and that she had an ovarian tumor besides.

The cancer poison, according to this theory, attacked the weakest organ—found that the ovary, being in a morbid condition, was least able to resist it, and therefore became locally manifest in the ovary. On the other hand, it is also possible that cancer was the original disease, and that it attacked the previously healthy ovary, and produced in it changes which were specific rather of the organ affected than of the poison.

Cancer does not always assume the form which has just been described: hard cancer may be developed in the fibrous stroma quite independently of the follicles. There can be little doubt that we are as yet quite—almost entirely—ignorant of the relation of cancer to ovarian disease. Ordinary ovarian cysts often produce a simulation of the cachectic symptoms of cancer; and it is well to bear in mind what Dr. Bright enunciates so well, that the ovaries 'in their natural structure seem to present a prototype of that involved system of cellular enlargement observed in malignant growths.'

Perhaps by the careful study of morbid ovarian growths our knowledge of the nature of malignancy may some day be signally increased.

In the cases of ovarian tubercle which have come under my observation, the tubercular matter was scattered over the peritoneal surface of ordinary multilocular cysts. I have never been fortunate enough to meet with hydatids in the ovary.

In this very imperfect sketch I have only attempted to hint at the conclusions towards which one tends after honestly working at the subject for many months.

Possibly the sketch may be useful in indicating the general line of research which may most advantageously be pursued in studying the different varieties of cysts of the ovary.

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